


# The Ontario Economy 1977-1987



David K. Foot  
James E. Pesando  
John A. Sawyer  
John W. L. Winder

Ontario Economic Council

1978 1979  
1980 1981  
1982 1983  
1984 1985  
1986 1987



Digitized by the Internet Archive  
in 2018 with funding from  
Ontario Ministry of Finance

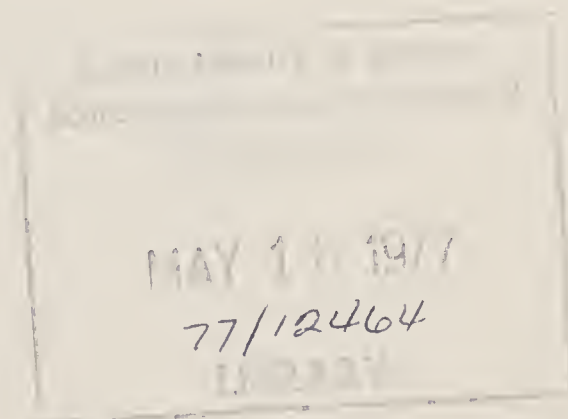
<https://archive.org/details/ontarioeconomy1900foot>

eccb

# The Ontario Economy 1977-1987

David K. Foot  
James E. Pesando  
John A. Sawyer  
John W. L. Winder

Institute for Policy Analysis  
University of Toronto





© Ontario Economic Council, 1977  
81 Wellesley St. E.  
Toronto, Ont. M4Y 1H6

HC  
117  
06I8367



## PREFACE

This study was commissioned by the Ontario Economic Council and the work done during the period June to December, 1976. The project had a two-fold objective: (1) to make some projections of the economic outlook for the Province of Ontario during the next decade in such a way as to give an indication of some of the economic problems the Province might face over this period, and (2) to do these projections in a systematic way utilizing an econometric model and a computer program so that interested users can update the projections as new data become available or make alternative projections based on different assumptions.

We would like to express our appreciation to Chukwuma Obidegwu, Elizabeth Plumb, and Janet Yale for research assistance, to Charles Cohen for developing the population model, and to Ann Jones, Linda Sarkar and Lorelle Triolo for secretarial assistance.

We would also like to thank Donald Dawson, Frank Denton, John Haberer, Douglas Hartle, David Laidler, John Pattison, Dorothy Walters, and two anonymous readers for comments on earlier drafts of this study. We did not always accept their criticisms and suggestions. They did, however, stimulate us to formulate and to test our hypotheses more precisely and to clarify our exposition. We accept full responsibility for any errors which may remain.

Institute for Policy Analysis  
University of Toronto  
February, 1977

D.K.F.  
J.E.P.  
J.A.S.  
J.W.L.W.



## TABLE OF CONTENTS

	Page
1. Introduction	1
2. The National Economy by D.K. Foot, J.A. Sawyer and J.W.L. Winder	17
Appendix 2.1 Energy Projections	75
Appendix 2.2 The TRACE Model	83
3. Population and Labour Force by D.K. Foot	89
Appendix 3.1 The Ontario Population Projection Model	137
Appendix 3.2 Projected Ontario Population Under Alternative 'Residual' Assumptions, Selected Years	140
Appendix 3.3 Participation Rate Equations	141
4. Capital Markets by J.E. Pesando	153
5. Ontario Government Revenue and Expenditure by J.W.L. Winder	181
Appendix 5.1 Methodology of Projecting Ontario Government Revenue and Expenditure	217
Appendix 5.2 Ontario Expenditures	249
Appendix 5.3 Linking Equations for the Revenue and Expenditure Projections	267
6. Output and Employment by J.A. Sawyer	275
Appendix 6.1 Methodology of Projecting Real Provincial Product and Employment by Industry	297
7. Some Alternative Projections by J.A. Sawyer and J.W.L. Winder	309
8. Policy Issues and Conclusion	333
Bibliography	345



# DETAILED TABLE OF CONTENTS

	Page
1 INTRODUCTION	1
1.1 Overview	1
1.2 Methodology	8
2 THE NATIONAL ECONOMY	17
2.1 Introduction	17
2.2 The Short-Run Economic Outlook	20
2.3 Energy Investment	21
2.4 World Trade Outlook	31
2.5 Population and Labour Force	33
2.6 Potential Output	39
2.7 Aggregate Demand	42
2.8 Aggregate Output, Wages and Prices	45
2.9 Industry Output and Employment	47
2.10 Personal Income	50
2.11 Balance of International Payments	50
2.12 Summary	52
Appendices	
2.1 Energy Projections	75
A2.1 Investment	75
A2.2 Royalties and Subsidies	78
A2.3 Price Index for Imports and Export of Mineral Fuels and Lubricants	78
2.2 The TRACE Model	83
3 ONTARIO'S POPULATION AND LABOUR FORCE	89
3.1 Introduction	89
3.2 Population	91
3.2.1 Population - Past	91
3.2.2 Population - Present	99
3.2.3 Population - Future	101
3.3 Participation Rates	110
3.3.1 Participation Rates - Past	110
3.3.2 Participation Rates - Present	115
3.3.3 Participation Rates - Future	117
3.4 Labour Force	117
3.4.1 Labour Force - Past	117
3.4.2 Labour Force - Present	120
3.4.3 Labour Force - Future	122
3.5 Comparison with Other Studies	125
3.6 Conclusions	134

# DETAILED TABLE OF CONTENTS

	Page
Appendices	
3.1 The Ontario Population Projection Model	137
3.2 Projected Ontario Population Under Alternative 'Residual' Assumptions, Selected Years	140
3.3 Participation Rate Equations	141
 4 CAPITAL MARKETS	 153
4.1 Introduction	153
4.2 The Outlook for the Canadian Capital Market: 1977-1987	154
4.3 The Role of Provincial Financing	163
4.3.1 Historical Data on Financing Requirements of the Province of Ontario	165
4.3.2 Projections of Non-Public Sources of Funds	168
4.3.3 Issues Involving the Financing of the Canada Pension Plan	173
4.3.4 Overview and Implications	178
 5 ONTARIO GOVERNMENT REVENUE AND EXPENDITURE	 181
5.1 Introduction	181
5.2 The Revenue Categories	182
5.3 The Expenditure Categories	185
5.4 Economic Background for the Projections	189
5.5 The Revenue Projections	194
5.6 The Expenditure Projections	199
5.7 Implications for Net Cash Requirements	206
Appendices	
5.1 Methodology of Projecting Ontario Government Revenue and Expenditure	217
A5.1 Ontario Revenues	217
A5.1.1 Background	217
A5.1.2 General Comments on Empirical Analysis	221
A5.1.3 Personal Income Taxes: OTYP	224
A5.1.4 Ordinary Incorporated Income Taxes: OTYC	231
A5.1.5 Retail Sales Taxes: OTRS	233
A5.1.6 Motive Fuels Taxes: OTMF	234
A5.1.7 Other Taxation: OT0	235
A5.1.8 Health Premiums: OHIP	238

# DETAILED TABLE OF CONTENTS

	Page
A5.1.9 LCBO Profits: OGREVL	240
A5.1.10 Liquor Licences and Permits: OLLP	241
A5.1.11 Motor Vehicle Licences and Permits: OGREVV	242
A5.1.12 Miscellaneous Other Revenue: OGREVM	244
A5.1.13 Payments from the Federal Government: OGREVF	245
A5.1.14 Interest on Investments: OGREVI	246
A5.1.15 Total Non-budgetary Revenue: OGREVN	247
A5.2 Ontario Expenditures	249
A5.2.1 Background	249
A5.2.2 Empirical Analysis of the Expenditure Categories	257
A5.3 Linking Equations for the Revenue and Expenditure Projections	267
 6 OUTPUT AND EMPLOYMENT	 275
6.1 Introduction	275
6.2 Sources of Growth	276
6.3 Growth of Output and Employment	279
6.4 Structure of Industry	283
6.5 Unemployment	287
6.6 Conclusion	289
Appendices	
6.1 Methodology of Projecting Real Provincial Product and Employment by Industry	297
A6.1 Introduction	297
A6.2 Conversion of Final Expenditure into Output by Industry	298
A6.3 Employment Projections	303
A6.4 Ontario Output and Employment Projections	306
A6.5 Alternative Methodologies	307
 7 SOME ALTERNATIVE PROJECTIONS	 309
7.1 A Low-Price Energy Scenario	309
7.1.1 Effects on the National Economy	310
7.1.2 Effects on Ontario Output and Employment	315
7.1.3 Effects on Ontario Government Revenue and Expenditure	316



DETAILED  
TABLE OF CONTENTS

	Page
7.2 The Effect of a Tax Cut	326
7.2.1 Effects on the National Economy	326
7.2.2 Effects on the Ontario Economy	329
7.3 Sensitivity of Projections to Assumptions	330
7.3.1 A Change in the Immigration Rate	330
7.3.2 A Change in the Foreign Exchange Rate	331
7.3.3 A Change in Real Government Expen- diture	332
8 POLICY ISSUES AND CONCLUSIONS	333

# LIST OF TABLES

		Page
2.1	A Projection of Principal Macroeconomic Variables: Canada	18
2.2	Period Total Fertility Rate in Canada	34
2.3	Average Annual Immigration to Canada	34
2.4	Population Levels and Growth in Canada	38
2.5	Determinants of Labour Force Growth in Canada	39
2.6	Growth of Real GNP and Aggregate Demand Components	43
2.7	Canada: Industrial Distribution of Output	48
2.8	Canada: Industrial Distribution of Employment	49
2.9	Personal Disposable Income Per Person	51
	High-Price Energy Projections for Canada 1975-1987 from the TRACE Model Mk IVD	
2.10	Summary of Projection	56
2.11	Gross National Expenditure in Current Dollars	60
2.12	Gross National Expenditure in Constant (1971) Dollars	64
2.13	National and Personal Income	68
2.14	Canada: Real Domestic Product by Industry	70
2.15	Canada: Employment by Industry	72
A2.1	Investment in the Fuel and Power Sectors as a Per Cent of Total Non-Residential Business Investment	76
A2.2	Estimated Energy-Related Capital Requirements, 1977-1987, High-Price Scenario	77
A2.3	Energy Exports	80
A2.4	Energy Imports	82
3.1	Ontario Vital Statistics, 1950-75	92
3.2	Estimated Components of Ontario Population Growth, 1951-75	94
3.3	Annual Averages of Ontario Population Growth Components, 1951-75	95
3.4	Birth, Fertility and Death Rates in Ontario, Selected Years, 1950-75	95
3.5	Immigration to Ontario as a Percentage of Immigration to Canada, 1925-75	104
3.6	Projected Population for Ontario, 1975-87	108
3.7	Ontario Participation Rates, Selected Age-Sex Groups, 1956-75	112
3.8	Participation Rates in Ontario Under the Old and Revised Labour Force Surveys, 1975	116

# LIST OF TABLES

	Page	
3.9	Projected Ontario Participation Rates Selected Age-Sex Groups, 1976-87	118
3.10	Labour Force Growth in Ontario, 1951-75	119
3.11	Calculation of Labour Force Source Population Adjustment Factors ( $\alpha_j$ ), 1975	123
3.12	Ontario Labour Force Source Population Projections, Selected Age-Sex Groups, 1975-87	124
3.13	Ontario Labour Force Projections, Selected Age-Sex Groups, 1976-87	126
3.14	Total Ontario Labour Force Projections, 1975-87	128
A3.1	Ontario Participation Rate Equations, 1956-74	146
A3.2	Linking Equations for Ontario Participation Rates, 1956-74	150
4.1	Consolidated Capital Finance Account	156
4.2	Gross Capital Formation and its Financing, as Per Cent of Gross National Product	158
4.3	Province of Ontario Cash Requirements, Related Measures, 1970-76	166
4.4	Sources of Provincial Financing, 1970-76	167
4.5	Major Non-Public Source of Funds, 1976-87	170
5.1	Actual Ontario Government Revenues 1975/76	183
5.2	Actual Ontario Government Expenditures 1975/76	186
5.3	Growth Rates of Key Income Projections	190
5.4	Ontario Government Revenues	192
5.5	Growth Rates of Revenue Projections	195
5.6	Ontario Government Expenditures	200
5.7	Growth Rates of Expenditure Projections	204
5.8	Ontario Government Revenues 1976/77	209
5.9	Ontario Government Expenditures 1976/77	210
A5.3	Results for the 'Preliminary' per Capita Expenditure Equation	263
A5.4	Modifications to the 'Preliminary' Equation for Selected Expenditure Categories	266
6.1	Ontario: Growth in Output, Employment and Productivity	280
6.2	Ontario: Industrial Distribution of Output	284
6.3	Ontario: Industrial Distribution of Employment	285
6.4	Ontario: Population, Labour Force, Employment and Unemployment	288
	Ontario: Real Output and Employment High- Price Energy	
6.5	Ontario: Real Provincial Product by Industry	292
6.6	Ontario: Employment by Industry	294



# LIST OF TABLES

	Page
A6.1 GDP at Factor Cost by Industry and Other Primary Input per \$1 million of Final Expenditure (1966)	299
A6.2 Coefficients Used in Computer Calculations	304
7.1 Estimated Energy-Related Capital Requirements, 1978-1987, (Low-Price Scenario)	311
7.2 Macroeconomic Effects of Low-Price Energy: Canada	312
7.3 Balance-of-Payments Effects of Low-Price Energy: Canada	314
7.4 Effects on Ontario Output and Employment of Low-Price Energy	316
7.5 Revenue-Expenditure Effects of Low-Price Energy Energy: Ontario	318
7.6 Distribution of Expenditure Effects of Low- Price Energy: Ontario	319
7.7 Distribution of Revenue Effects of Low-Price Energy: Ontario	320
7.8 Low-Price Energy, Summary of Projections	322
7.9 Macroeconomic Effects of an 8 Per Cent Cut in Personal Income Tax: Canada	327
7.10 Public Finance Effects of an 8 Per Cent Cut in Personal Income Tax: Canada	328
7.11 Effects on Output, Employment and Labour Force of an 8 Per Cent Cut in Personal Income Tax: Ontario	329
7.12 Public Finance Effects of an 8 Per Cent Cut in Personal Income Tax: Ontario Government	330
7.13 Change in Macroeconomic Variables Resulting from a 1 Per Cent Depreciation of the Canadian Dollar: Canada	331
7.14 Effect of a Maintained Increase in Real Government Expenditure per Billion Dollars of Real Expenditure, Assuming Flexible Exchange Rates	332

# LIST OF CHARTS

	Page
2.1 Components of Energy Investment, 1976-1990 (High-Price Scenario)	27
2.2 Balance-of-Trade in Energy Commodities (High-Price Scenario)	30
2.3 Projected Age Structure of the Canadian Population, 1975	36
2.4 Projected Age Structure of the Canadian Population, 1990	37
2.5 Sources of Growth in Potential Output in Commercial Non-Agricultural Industries 1954-1987	41
2.6 Change in Output in Commercial Non-Agricul- tural Industries 1954-1987	46
3.1 Age-Sex Composition of Ontario Population, 1971 and 1975	100
3.2 Projected Age-Sex Composition of Ontario Population, 1982	106
3.3 Projected Age-Sex Composition of Ontario Population, 1987	107
3.4 Historical and Projected Ontario Population Composition, Selected Age Groups, 1950-90	109





## INTRODUCTION

### 1.1 OVERVIEW

The objective of this study is to draw attention to some problems which may confront the Ontario economy over the decade 1977-87 if certain economic trends continue or if certain events occur. In particular, the study examines trends in population, labour force, industrial output and employment, provincial government revenues and expenditures, and capital markets. The background for the Ontario projections are projections of the Canadian economy.

Chapter Two presents a projection of a possible economic path for the Canadian economy as a whole over the next decade. This projection is based on the high-price energy scenario contained in An Energy Strategy for Canada published by the Canada Department of Energy, Mines and Resources (1976). This energy scenario contains an energy investment boom which is assumed to peak in 1984. These energy investments shape the character of the output and employment projections in this study and impart to them a cyclical pattern. In the event that the actual timing of some of the energy projects is different or if the investments are spread out more over time so that there is less of a sharp peak in the early 1980s, the cyclical pattern of the projections for the Ontario economy would be markedly different.

Chapter Seven presents an alternative projection for the Canadian economy based on the low-price energy scenario of An Energy Strategy for Canada. In this scenario, there are lower investments in making fossil fuels available and higher investments in electric power. The investments are slightly lower in total and are spread out over time so that there is no cyclical pattern, but there is a marked increase in energy imports with resultant balance-of-payments problems in the latter part of the decade.

Both of these projections of the Canadian economy show a slowdown in the rate of growth of output for the economy relative to earlier decades because of (1) a slowdown in the rate of growth of potential output attributable to lower rates of population growth and lower rates of growth in capital stocks in the non-energy sectors of the economy, and (2) a failure of aggregate demand to grow sufficiently rapidly (in the absence of a stimulus from governments) for the economy to recover fully from the 1975 recession. While energy investments partially offset this tendency towards a lower rate of growth in aggregate demand, the net result is an economy in which resources tend not to be employed at the same intensity as in previous periods of high economic activity. In Chapter Seven, the effects of a cut in personal income tax are examined as one means of providing some additional stimulus to aggregate demand.

One development which may affect the future has not been taken into account - the future position of Québec. It is too early to know what the relation of Québec to the other provinces might be and what might be

implied by independence. René Lévesque has spoken of having both a customs and a monetary union with the rest of Canada. This would imply no customs import duties between Québec and the rest of Canada and a common tariff against the rest of the world. Given the General Agreement on Trade and Tariffs (GATT), this common tariff is not likely to be higher than the present one. If there were a monetary union, there would be a common currency. Presumably this implies a common monetary policy and a single central bank, although this seems to be partially in conflict with the Parti Québécois' stated desire to control the banking system in Québec. In the event of both a customs and a monetary union, the real effects of a different status for Québec would show up in fiscal arrangements. There might well be a substantial handing over of fiscal authority to all the provinces with the consequent loss of a central fiscal authority which could use fiscal policy as a device for economic stabilization. Although the provinces can use fiscal policy for this purpose, it is much more difficult to obtain a consistent policy from ten different authorities. This could have important consequences both for the stability of the Québec economy and the stability of the other provinces. Insofar as the Parti Québécois proceeds with increased nationalization of industry, this can proceed within the present framework of Confederation, as is witnessed by provinces in which the New Democratic Party is in power.

The fact that this study of the Ontario economy does not consider the future status of Québec should not be taken as an indication that it

is unimportant. Indeed it should be the subject of a major study when sufficient facts emerge to make such a study more than mere speculation. Its omission from the present study simply reflects the lack of facts and the unwillingness to speculate in the absence of facts.

Chapter Three is concerned with the size, growth and composition of Ontario's population and labour force - past, present and future. The trends of the past are analysed and a methodology developed to obtain an internally consistent projection for the demographic sector of the Ontario economy. Since labour force is determined from the product of population and labour force participation rates, the chapter first analyses population trends. This is followed by an analysis of labour force participation rate trends and a discussion of the implications for labour force growth. The chapter concludes with a brief comparison of the results with other similar studies and a summary of the main findings.

Based on assumptions regarding fertility and net migration into Ontario, the Ontario population is projected to gain around 1.25 million persons between 1977 and 1987. There will be a significant aging of the Ontario population and the population growth is projected to be lower than the historical average throughout the period. The historical trends in labour force participation rates for various age-sex groups are explained by medium-term factors such as urbanisation, schooling, fertility and old age security, in addition to the traditional income and labour market variables. Projections of these rates show increases in the younger age



groups and for prime age females, a slight decrease in the rates for prime age males and little change in the rates for the older groups. Based on these projections of population and participation rates, the Ontario labour force is projected to grow by over 0.9 million persons between 1977 and 1987. The growth rate will, however, be lower than recent historical experience and there will be a noticeable slowing by the mid-1980s. The composition of the labour force will also change to show an increasing percentage of women, especially prime age women, and a decreasing percentage of the young in the labour force.

Although the models developed and used are not the same as those employed in other similar studies, the conclusions are broadly consistent with those reported elsewhere. These conclusions have important implications for the future development of the labour market in Ontario and for the growth potential of the Ontario economy. They suggest that there is likely to be a slowing in the rate of growth of potential output of the Ontario economy in the years ahead. This point underlies much of the discussion that is presented in the subsequent chapters.

Chapter Four begins with a brief discussion of the possible emergence of a "capital shortage" during the next decade. The discussion then turns to the major developments which are likely to characterise the Canadian capital market in the years ahead. In the high-price energy scenario, the projection indicates an historically high level of business fixed investment in the next decade, to be financed by a combination of higher personal saving, greater undistributed corporate profits, and a higher net inflow of



capital from abroad. The problems posed by inflation for the financing of real investment are noted, as are the favourable implications of the gradual reduction in the rate of inflation foreseen over the next decade.

The major emphasis in the chapter is on the analysis of the financing requirements of the Province of Ontario. The most important development is a marked reduction in the flow of funds available to the Province from the Canada Pension Plan and other superannuation funds. For the past ten years, the Province has relied almost exclusively on borrowing from these non-public sources to meet its cash requirements. In view of the importance to the Province of maintaining its high credit rating, and thus ensuring its access to the United States capital market, the input of financing considerations into taxation and/or expenditure decisions of the Province will undoubtedly assume greater importance in the years ahead. Because of the interdependence of the borrowing requirements of the Province and Ontario Hydro, planned capital expenditures of Ontario Hydro may also be adjusted in response to the tightening financing constraints.

Chapter Five presents projections of the revenues and expenditures of the Government of Ontario. These projections are based on the income and employment projections of the other chapters and so are consistent with them. Revenues are projected separately for five categories of taxes and for various fees, premiums, and other revenues. Expenditures are projected for a number of categories including health, education, transportation and communication, and community and social services. Both budgetary and non-budgetary items are taken into account so that net cash requirements are

also projected.

If the projected growth rates of expenditure and revenue were in fact to take place, expenditures would grow faster than revenues. Hence, cash requirements as a percentage of total revenues would increase dramatically, particularly in the latter half of the decade. The last section of Chapter Five contains an assessment of the projections which suggests that the cash flow requirements may not, however, be quite so large as first indicated if recent restraints on the rate of increase in expenditures continue.

Various alternatives for closing the gap between revenues and expenditures are examined. For example, measures to increase the yield from personal income taxes would contribute to closing the gap, as would an increase in the corporate tax rate. Alternatively, or in conjunction with revenue increases, the rate of growth of some expenditure programs might be lowered. The marked reduction of the flow of funds available to the Province from the Canada Pension Plan and other superannuation funds in the 1980s, discussed in Chapter Four, increases the pressure for the Province to close the gap between revenue and expenditure.

In Chapter Six the prospects, based on the high-price energy scenario, for the growth of output and employment in Ontario are examined. The projections indicate an increasing proportion of output will be in the service, rather than the goods-producing, industries. This is because the slow growth in aggregate demand for goods, apart from the anticipated boom in energy invest-

ments, holds down the rate of growth of the goods-producing industries. Thus, the proportion of output produced in the service industries is projected to rise from 57 per cent in 1977 to 60 per cent in 1987. Because productivity increases tend to be much greater in goods-producing industries, the change in the industrial distribution of employment is even more marked. The proportion of workers employed in the service industries is projected to rise from 64 per cent in 1977 to 72 per cent in 1987. The low growth rates in employment in this scenario lead to unemployment rates which are high by historical standards. The shift in aggregate demand towards the products of service industries suggests that a high proportion of new entrants into the labour markets should have received training relevant to employment in the service industries.

In Chapter Seven the implications of the alternative low-price energy scenario for the Ontario economy are examined.

Chapter Eight concludes the study with a summary statement of some of the economic problems which may emerge in the coming decade and suggests some policies for dealing with them.

## 1.2 METHODOLOGY

The projections in this study are based mainly on econometric techniques. Such techniques are based explicitly on past historical behavioural relationships which are assumed to remain stable through time. In that

sense they assume that past history is relevant to the future. Econometric techniques have a number of important advantages over either purely statistical projections or judgmental forecasts. Econometrics enables relevant economic theory to be used for quantitative analysis. Moreover, standard statistical tests of hypotheses can be performed to assess whether the data support a theory. Thus, other economists can assess the validity of the method - an assessment which cannot be made of judgmental forecasts.

An econometric model also makes explicit the conditional nature of any forecast or projection. Not only are certain behavioural relations assumed to be constant, but the way in which the forecast or projection is dependent upon the values of policy variables (such as tax rates) or on external or noneconomic variables (such as world trade or population) is also made explicit. Thus, the sensitivity of the forecast to alternative assumptions about behavioural relations or about variables whose values are taken as inputs into the forecast can be tested. This is not possible for purely statistical time series projections.

It must be emphasized, therefore, that the projections in this study are conditional projections. They are not forecasts. They will only agree with reality if the assumptions which constitute the underlying conditions are in fact realized. To stress the conditional nature of the projections, Chapter Two sets out a specific set of assumptions involved in making the conditional projection that is made of the national economy in that chapter. This set of assumptions underlies the projections for the



Ontario economy in Chapters Three to Six. In Chapter Seven, an alternative set of assumptions is made and an alternative scenario for both the national economy and the province is derived. In this respect it is important to note that economics and econometric models are better suited to explaining the change in certain economic variables that will result from specified changes in other economic variables than they are to explaining the level of variables which may actually be realized.

If conditional projections are not pure forecasts, of what use are they? Their principal value in the context of this study is in drawing attention to certain problems which will arise if the projections are realized. Thus, policies may be changed and the economy moved closer to an optimal position - which means that the projection would not be realized.

To be used as forecasts (for example), as inputs into sales forecasts by businesses), two things must be done. In the first place, the possibility that policies will change in response to the projections must be taken into account and adjustments made to the projections. Secondly, probabilities must be assigned to the various adjusted conditional projections and an "expected value" arrived at.

What is to be done if the user's prior feelings about the assumptions underlying the conditional projections do not agree with any of the sets of assumptions that were actually made? If the models are available on a computer system, then it usually is a relatively simple matter for a user to request a change in the assumptions and have a new conditional projection



generated that is in accordance with these assumptions.

With this background in mind, a brief overview of the models used for this study may be helpful to the reader. The population projections for Canada and Ontario that entered into the projections for the national economy in Chapter Two and for Ontario in Chapter Three came out of population projection models developed at the Institute for Policy Analysis of the University of Toronto which are described in Cohen (1976) and in Appendix 3.1. These population models enable year-by-year projections to be made according to age-sex breakdowns, given the user's assumptions concerning migration, fertility, and mortality rates. The projection of the national economy came out of the Institute's TRACE model, a macroeconomic model, a brief description of which is given in the Appendix 2.2. An input-output matrix and a set of projection equations were appended to the TRACE model to distribute the TRACE model's projections of output and employment by industrial divisions. The procedure used is described in Appendix 6.1.

A complete model of the Ontario economy was not constructed for the projections of the Ontario economy described in Chapters Three, Five and Six. An econometric model for the Ontario economy had been built in the Ministry of Treasury, Economics and Intergovernmental Affairs of the Government of Ontario by Haronitis (1971) but is no longer maintained. This model was a model of nominal income determination which contained a set of equations to explain components of provincial government revenue. The data base for this model was largely provided by the set of

Provincial Income and Expenditure Accounts developed in the Ministry. Apart from the fact that it would have been expensive to update the model, the model had several defects for the purpose of this study. It was not specifically related to the national economy so that changes in national variables, such as energy investments or fiscal policy, could not be readily translated into the impact on the provincial economy. Moreover, a major difficulty with any provincial model lies in the problems of obtaining data relating to interprovincial trade; hence, provincial exports were not well explained. The model did not include sectors dealing with the determination of real output, employment, and labour force. Nor did it explain provincial government expenditure. Another model of the Ontario economy, ONFORM, developed by the Ministry of Treasury, Economics and Intergovernmental Affairs is referred to by Jutlah (1974). Although this model was used by Jutlah for projections of the Ontario economy, it has not been published.

The projections for Ontario in Chapter Five of government revenues and expenditures follow a method used by Foot (1975b) in which explanatory variables such as income are derived from the national projections of Chapter Two by linking equations. Ontario government revenues and expenditures are then related to Ontario incomes and other relevant variables. Using this method there is an immediate response in this sub-model to changes in the national projections from the TRACE model.

The discussion of financing decisions in Chapter Four is not based on econometric techniques. Any attempt to develop an econometric model

of the financing decision is, unfortunately, destined to meet with limited success. If the financing requirements implicit in initial revenue and expenditure projections are deemed to be excessive, discretionary tax and/or expenditure changes are likely to be made - perhaps through an iterative process - until the implied cash requirements fall within acceptable bounds. Ontario's 1976 Budget<sup>1</sup> provides an excellent example of the manner in which the financing implications of initial revenue and expenditure patterns can lead to adjustment of both the revenue and expenditure components. This process is, however, virtually impossible to quantify and thus does not lend itself to econometric investigation.

In Chapter Three, as indicated above, the population model for Ontario developed at the Institute was used to generate population projections. A submodel which explains Ontario participation rates for various age-sex groups in terms of Ontario income, employment, and other variables was then developed. These participation rates were applied to the population projections to give labour force projections.

As mentioned above, the national projections from the TRACE model of expenditures by persons on consumer goods and services, by government on goods and services, by business on capital goods, and by non-residents on exports of Canadian goods and services were translated via an input-output

---

1 See Ontario, Budget (1976), Budget Paper C: "Restraining Expenditure in Ontario".

matrix into estimates of real domestic product and employment by industrial divisions at the national level.

To project industry output and employment forward in time it was assumed that average labour productivity in each industrial division continues to grow at recent historical rates and that average hours worked per week continue to decline in each industrial division at recent historical rates. Then, in Chapter Six, shares of output and employment for each industrial division were allocated to Ontario. The principal advantage of this method is that the provincial projections respond automatically to changes in variables affecting the level or composition of aggregate demand at the national level. The principal disadvantage is that the method assumes that the only difference between the provincial and national economies is the proportion in which the various industries are represented. That is, the relation between final expenditure and industry output and between input and output (productivity) is assumed to be the same at both the national and provincial levels.

When the labour force projections of Chapter Three are combined with the employment projections of Chapter Six, estimates of the unemployment rate in Ontario over the next decade are obtained. There is some interaction between the various submodels of Ontario used in the various chapters since (1) the unemployment rate appears, as an indicator of the phase of the business cycle, in some of the government revenue equations, (2) employment enters into one of the government expenditure equations, (3) population enters into all government revenue and expenditure equations since they were



estimated on a per person basis, and (4) employment enters into the labour force participation rate equations.

The TRACE model, the population models, the Ontario submodels, and the related databanks used in this study are all mounted at the University of Toronto Computer Centre. They are available to interested users for noncommercial purposes.

Databanks and the econometric models based on them tend to become obsolete quickly as new statistics appear and old ones are revised. If the Ontario submodels used in this study are of interest, it is hoped that this study will encourage an agency or department of the Government of Ontario to adopt the models, maintain the databanks, and gradually develop a set of regularly published reports on the long-term outlook for the provincial economy in which all the details of the methodology and the assumptions are published. An important element of such a program must be the development of a set of consistent provincial statistics on industry output and employment comparable to those published at the national level by Statistics Canada in Aggregate Productivity Measures (Catalogue No. 14-201). Since these are based on establishment statistics, it is feasible to obtain them on a provincial basis. These statistics would complement in a valuable way the set of provincial income and expenditure accounts currently maintained (although unfortunately not published) by the Ontario Ministry of Treasury, Economics and Intergovernmental Affairs. These accounts give information on the demand side; the supply side is missing. It is the present intention of



the Institute for Policy Analysis of the University of Toronto, resources permitting, to continue to maintain and periodically update the TRACE and national population models.

THE NATIONAL ECONOMY

by

David K. Foot, John A. Sawyer, and John W.L. Winder

2.1 INTRODUCTION

As a background for projecting a possible path for the Ontario economy over the next decade and indicating possible economic problems, a projection was made for the total Canadian economy. This projection was based on a number of key assumptions. The implications of these assumptions for gross national product and other macroeconomic variables were then derived by feeding the assumptions into the University of Toronto's TRACE model. The resulting projection is therefore conditional upon those assumptions being realized.

In keeping with current short-run forecasts of the economy, it has been assumed that there will be a slow recovery from the 1975 recession. It is also assumed that there will be an orderly withdrawal from the income controls sometime during 1977 or 1978. The slow recovery from the recession will reduce the inflationary pressures in the economy and permit the withdrawal of the controls in such a way that there will not be a flare-up of inflationary forces. As indicated earlier, it is also assumed that Québec will continue to be within Canada and that no major disruptions in

TABLE 2.1

A PROJECTION OF PRINCIPAL MACROECONOMIC VARIABLES:  
CANADA  
(High-price energy scenario)

	Average Annual Growth Rates (per cent)		
	From 1975 to 1977	From 1977 to 1982	From 1982 to 1987
Real Gross National Product	4.5	5.0	4.0
GNP Price Index	8.1	4.7	4.4
	Average Rate (per cent)		
	1976-77	1978-82	1983-87
Unemployment Rate	7.3	7.7	6.1

Source: Table 2.10

either international or interprovincial trade will occur.

With respect to the longer-term outlook over the decade, several assumptions lead to moderate, if not slow, rates of growth in the economy. Although world trade is expected to recover somewhat from the recent recession level, the longer-term outlook built into the projection is for a slower rate of growth than occurred in the 1960s. The slowdown in population growth is expected to continue. Indeed, apart from immigration, the new entrants into the labour force over the next decade have already been born and will not therefore be affected by any changes in demographic factors. The recent restraint in government expenditure is assumed to continue and, to some extent, this lower rate of growth will be reinforced by the slowdown in the rate of population growth.

One dynamic force that will contribute to an expansion of the economy in the latter part of the 1970s and the early 1980s will be investment in energy facilities. If the present high price of energy continues, there will be substantial incentive for investment in fossil fuel energy sources and an energy investment boom is expected to occur during this period. In the event that these high prices are not expected to continue, however, a lower level and different pattern of energy investment would be expected to occur. The alternative scenario for the economy that might occur in this case is examined in Chapter Seven. The two alternative projections indicate some of the problems for the economy as a whole which energy investments may give rise to.

The projection is made on the assumption that the income velocity of money is constant and the exchange rate is fixed (see Section 2.11). Thus, the rate of inflation is determined by the rate of increase in prices of internationally traded goods and in unit labour costs of domestically produced goods. The principal assumption regarding the former is that the rate of inflation in the United States will slowly decline to about 3.5 per cent by the end of the projection period. The latter is endogenously determined by the TRACE model. With respect to fiscal policy, apart from the short-run stimulus discussed in the next section, no change is assumed in the rates of taxation or transfer payments during the projection period. Thus, the projection is intended to indicate problems which may arise in the absence of policy changes. The highlights of the projection are shown in Table 2.1<sup>1</sup>.

---

1 The details of the projection are shown in Tables 2.10 - 2.15 at the end of the Chapter. Figures for individual years are given for the benefit of secondary users. No great significance should be attached, however, to short-run variations.

## 2.2 THE SHORT-RUN ECONOMIC OUTLOOK<sup>2</sup>

The economic and political news in Canada and abroad continues to undermine the prospects for a sustained and vigorous recovery. Barring major new policy initiatives at home and abroad, the recovery no longer appears to have sufficient strength to attain growth rates over the next two years anywhere near the potential rate of growth. Given this dismal outlook, however, major fiscal measures are likely to be introduced in both the United States and Canada, unless the economic news improves significantly over the next few months. Assuming such fiscal policy measures are adopted, the outlook is, however, only for real growth at a rate of about 4 per cent in both 1977 and 1978. This modest rate of growth is consistent with a gradual increase in unemployment rates, which may average at about 7.5 per cent during this period. Because of the price effects of the recent depreciation of the Canadian dollar, the outlook for inflation has worsened somewhat.

The major sources of short-run weakness are investment expenditures and, to a lesser extent, government spending on goods and services. Residential construction expenditure also appears to be a source of weakness. The strengths in the economy come from export growth in response to a revival in world trade and a significant increase in the level of consumer spending.

Although it is tempting to compare the current situation with the

---

2 This section is based on Wilson and Jump (1976). The solution of the TRACE model for 1976-77 was adjusted to agree with the October, 1976 short-run forecast from the University of Toronto's QFM model.



period of slow growth that characterised the Canadian economy from 1957 to 1961, there are a number of features that indicate the economy is basically in a healthier position. Economic growth in the United States seems to be steadier. This will contribute to stronger export growth. Although investment and consumer durable spending have not been strong, they are not as weak as they were when the 1960 recovery was aborted. In the manufacturing sector both inventory sales and the relation of sales to new orders and unfilled orders appear healthier. The current economic recovery therefore appears more soundly based than in the 1957-1960 period.

The one area that gives rise to a major concern in the short run is the weakness of corporate profits, even after correction for the inventory valuation adjustment. This poorer profit performance may reflect the impact of the anti-inflation program. The poor profit performance is the key to current uncertainties in the business investment outlook and underlines the need for stimulus to encourage business investment.

### 2.3 ENERGY INVESTMENT<sup>3</sup>

The outlook for energy investment should be viewed in the context of recent price increases for Canadian oil and natural gas and in the context of announced federal government energy policy.

In April of 1976 the Honourable Alastair Gillespie, Minister of Energy, Mines and Resources of the Government of Canada set the stage for the increases he has since announced with the release of An Energy Strategy for Canada (1976) (to be referred to as the Strategy paper).

---

3 This section is a condensation of Winder (1976).

This 170 page publication reviews Canadian energy policies, particularly for the past two years, and assesses Canadian energy prospects over the next fifteen years. The energy scenarios set forth in the Strategy paper have been built into the TRACE model projections.

On the basis of its assessment of energy prospects, the Department of Energy, Mines and Resources (EMR) has also included in the publication a statement of National Energy Strategy, a set of policies designed to make Canada self-reliant in the energy field within the next ten years. Most of what follows is a summary of the Strategy paper, presented because the TRACE model projections explicitly incorporate the projections of energy investment contained in the Strategy paper, and in recognition of the tremendous importance energy developments have for the outlook for the next fifteen years.

The recent price increases for domestic crude oil and natural gas are in line with federal government policy stated in the Strategy paper. A key element of the strategy for energy self-reliance is what EMR describes as "appropriate" energy pricing. It is considered appropriate that domestic oil prices move towards (without necessarily catching up to) international levels. Before the recent increase, the Canadian wellhead price of \$8.00 per barrel was lower than in any other major western industrial country. It is also considered appropriate that domestic prices for natural gas move to a competitive relationship with oil over the next 2 to 4 years. The increases announced so far, however, have not helped reduce the extent to which natural gas has been under-priced. So far as exports are concerned, appropriate pricing is considered to be either at international prices (as in the case of oil) or at commodity-value in the markets where sold (as in the case of natural gas).

Another important aspect of their view of appropriate pricing concerns the pricing schedules of provincial utilities, which produce most of the electricity generated. These typically allow for the recovery of costs and the provision of some expansion capital. The latter helps keep down borrowing requirements. But the price schedules also tend to encourage consumption and therefore the demand for new facilities. EMR welcomes the fact that some provincial governments and utilities are re-examining their pricing policies and load-management techniques, for otherwise borrowing requirements could escalate out of control.

Appropriate energy pricing is clearly a key element in the strategy for self-reliance in energy. Other policies include conservation, increased exploration and development, and emergency storage of oil. Before reviewing these it is useful to consider a more explicit statement of the policy goal.

The aim of the strategy is energy self-reliance for Canada within ten years. It is founded on recognition of the fact that self-sufficiency in oil is not realistic within that time; perhaps not even within the next 15 years. Self-reliance is defined in terms of the extent to which Canada can become independent of imported oil from insecure sources and consequently less vulnerable to arbitrary changes in energy prices or prolonged interruptions in supply. It calls for an optimal program of reduction in oil imports and maintenance of a degree of emergency preparedness. Specifically, the target is to reduce net dependence on imported oil to one-third of our total oil demands by 1985. At the same time, self-reliance in natural gas is to be safeguarded until frontier resources can be marketed under acceptable conditions.

One objective therefore is to reduce the average annual rate of growth of energy consumption in Canada to less than 3 1/2 per cent over the next ten years. Canadian per person energy consumption has been second only to that of the United States. In 1971 Americans, on average, used about a third more; Canadians about 50 percent more than the average Swede, the third-ranking consumer. From 1960 to 1973 Canadian per person consumption increased at an annual rate of about 4 per cent. For the last three years of that period the rate was as high as 4 1/2 per cent. By 1974 Canadians were consuming the equivalent of 50 barrels of oil per person annually.

The reasons for the strategy are that past rates of growth in energy consumption are simply not sustainable. Additional domestic energy supplies, if available at all, will be very expensive. Foreign supplies will be expensive too, and perhaps unreliable.

Oil and natural gas currently account for about 65 per cent of total Canadian energy consumption and EMR believes they will continue to be the single most important energy source for the next 15 years. Without further oil sands developments or frontier oil and without deceleration in the rate of growth in energy consumption, EMR estimates that net oil imports could amount to 47 per cent of Canadian demand by 1985 and 68 per cent by 1990, if domestic prices had remained at the levels prevailing before the recently announced increases. With domestic energy prices in the range of current international oil prices, on the other hand, EMR estimates that those percentages could be reduced to 40 and 38 respectively, for 1985 and 1990. But EMR does not rely on price alone to ensure Canadian self-sufficiency



in energy. Reinforcing policy measures are being implemented relating primarily to conservation, increased exploration and development, and emergency storage of oil.

EMR aims to at least double exploration and development activity in the frontier regions, under acceptable social and environmental conditions, over the next 3 years. Looking as far ahead as the next 15 years, the estimate is that \$40 billion (in 1975 dollars) could be required for this purpose, over one-quarter of it by 1980. Exploration alone would constitute about 70 per cent of this total. These figures are included in their complete estimates of capital requirements in the energy sector (and in the figures in Appendix 2.2). The aim is twofold: to get the industry moving on exploration and development and to ensure greater Canadian content and participation in what is going on. Higher domestic prices should assist in the former objective. New regulations aim at the latter as well.

Two other specific policies for energy self-reliance relate to the construction of new delivery systems and encouragement of the potential for interfuel substitution. The Interprovincial Pipeline system has been completed to Montreal. The National Energy Board is currently hearing applications for two competing natural gas pipelines. Efforts are also underway to facilitate interregional electrical interconnections and assess the desirability and feasibility of making Alberta coal available to Ontario.

Under the best of circumstances, provision of additional domestic energy supplies will be expensive. As the accompanying Chart from the Strategy paper shows, as much as \$180 billion, in constant (1975) dollars, could be required over the period 1976 - 1990 in energy-related investment



in order to produce and deliver the potential supplies estimated to be available in EMR's 'high-price' scenario.

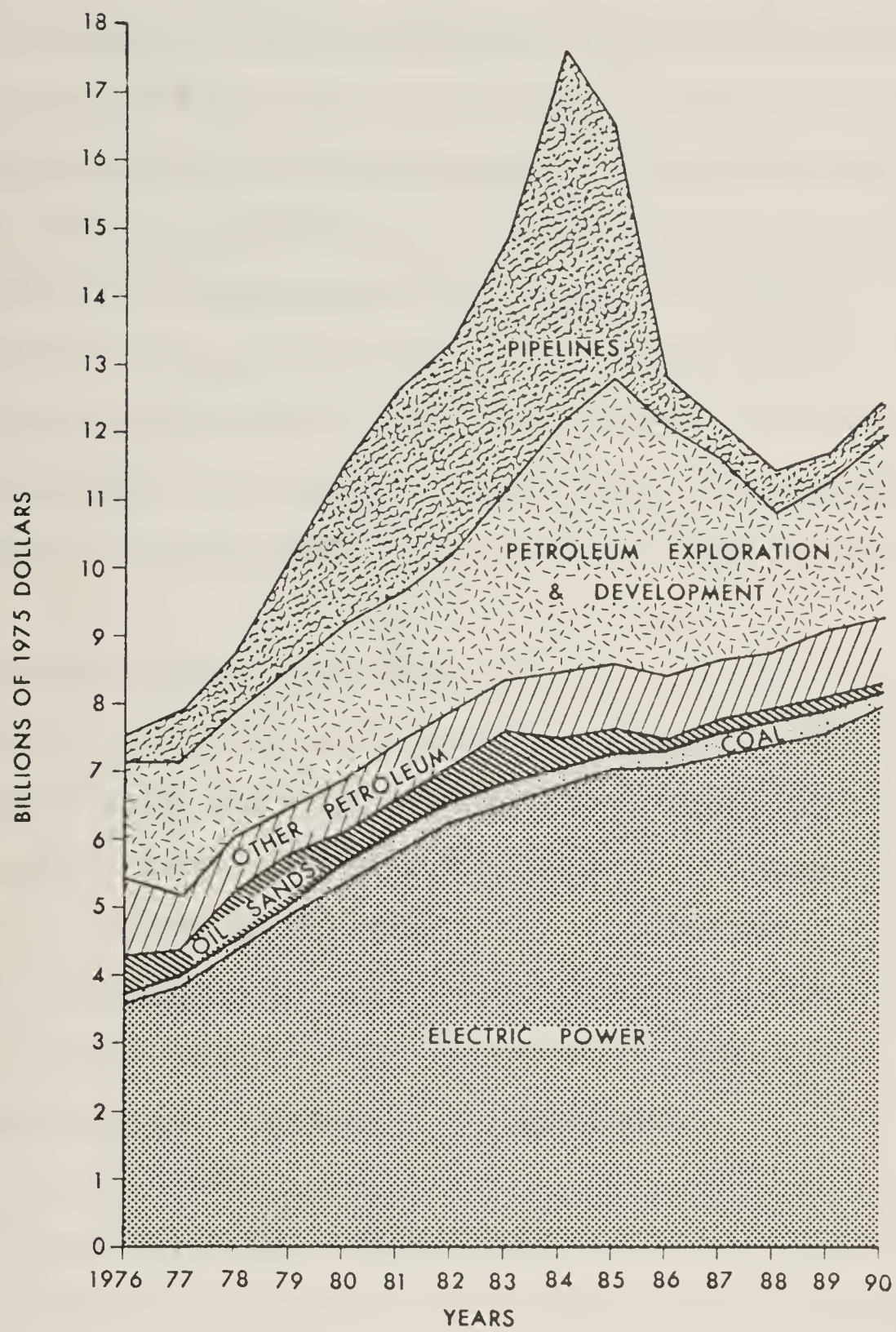
In this scenario, it is assumed that oil prices increase relatively faster than the prices of other goods and services until about 1978, when they reach a level that is roughly equivalent to the current international price (about \$13.00 per barrel landed in Montreal in 1975 dollars). Prices for electricity and coal are assumed to increase at the same rate as oil prices and the price of natural gas is ... assumed to adjust to 'commodity-equivalent' value with crude oil (\$2.25/Mcf at the Toronto city-gate, in 1975 dollars) by the last 1970s. After 1978, all energy prices are assumed to increase at only the general rate of inflation.

Insofar as possible (see Appendix 2.1), this scenario has been built into the TRACE projection. Recent increases in domestic prices of crude oil and natural gas are clearly consistent with it. Bringing domestic prices into line with international prices is expected to bring forth additional crude from the oil sands as well as frontier oil and natural gas which would not otherwise be available. About half of the capital investment in this scenario would be for electric power. The time profile reflects dramatic acceleration in northern pipeline expenditure through the late 1970s and early 1980s to a peak of about \$5.5 billion and an even more rapid decline within a couple of years to something like present levels of \$500 million. Petroleum exploration and development also peaks at about the same time.

Without the relative increases in domestic prices of oil and natural gas required for additional supplies to be forthcoming, the only alternative hope for coping with growing demand would be an even greater development of electric power. EMR estimates that the total cost would be almost as great;

CHART 2.1

COMPONENTS OF ENERGY INVESTMENT, 1976-1990  
(High-price Scenario)



Source: An Energy Strategy for Canada: Policies for Self-Reliance, Energy, Mines and Resources Canada, Energy Policy Sector, 1976, page 107.

about \$170 billion (1975) dollars. The time profile would of course be smoother. This alternative is discussed in Chapter Seven.

Either way the capital requirements are great. They could amount to 'higher-than-historical' expenditures of almost \$60 billion in 1975 dollars. EMR emphasises that 'higher-than-historical' energy investment of this magnitude raises the possibility of a number of adjustment problems such as the availability of labour, with the appropriate skills, and equipment, in the required amounts, at the prices implied. The profile itself of course exacerbates the problem and confronts the economy with a major macro-adjustment problem after the peak. In part, the purpose of the projection with the TRACE model is to see the magnitude of the macroeconomic problem.

There is also the problem of where the required funds are likely to come from. In the 'high-price' scenario the electrical utility sector and the petroleum industry together account for almost 83 per cent of total anticipated investment. So far as petroleum is concerned, it is estimated that, in this scenario, the cash flow position of the industry could be adequate to support the projected investment program through the next five years. For both industries, the critical factor appears to be the extent to which funds can be generated internally through higher energy prices. If regulatory decisions were to force electrical utilities into increasing their already high reliance on capital markets, there could be serious questions not only for their own financial viability but also for the capacity of the Canadian capital markets to accommodate their requirements. Continued reliance on foreign debt markets is implied in any case. The most



serious financing problems, in the view of EMR are likely to arise in the pipeline sector. Substantial issues of debt and equity will be required since, until deliveries commence, there will be no internally generated funds.

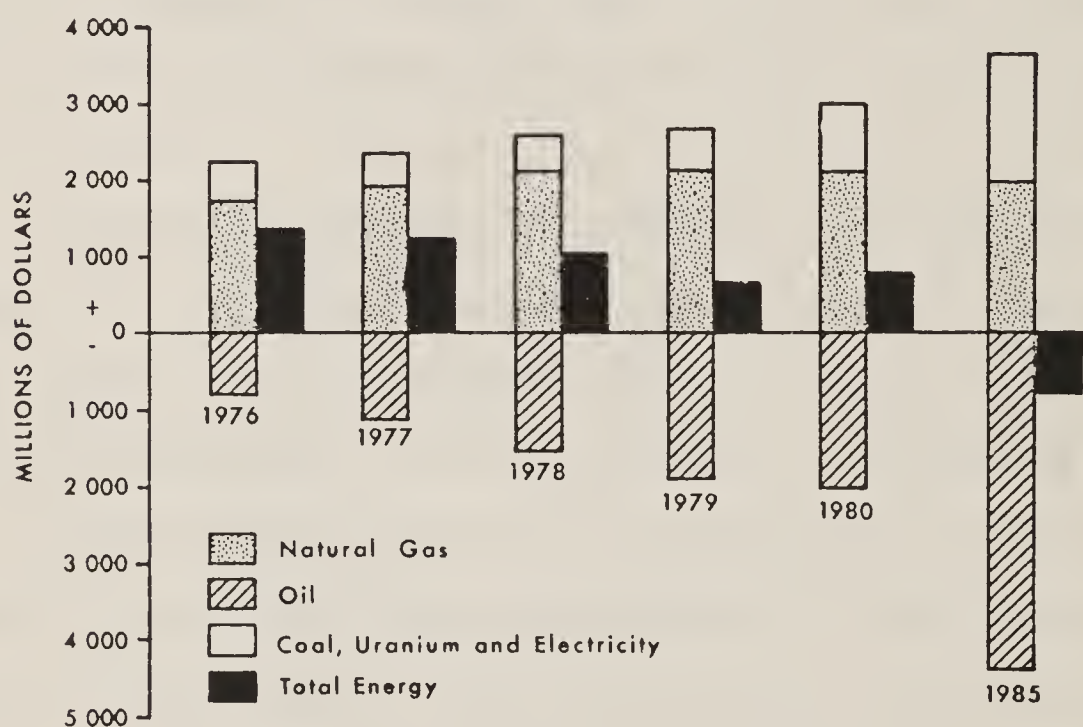
Recourse to foreign capital could ease the balance-of-payments strain arising from oil imports, but at the cost of possibly jeopardizing goals of nationalism. The trade-off between dependence on foreign oil and dependence on foreign capital may at least be expected to be less critical under the 'high-price' scenario.

The overall trade balance in energy commodities projected by EMR deteriorates consistently even in the high-price energy scenario (see Chart 2.2). Expressed in 1975 dollars, a surplus of about \$1.4 billion in 1976 falls to nearly \$800 million in 1980 and is turned into a deficit of this magnitude by 1985. With little change so far as natural gas is concerned, this overall balance emerges in spite of a large and growing surplus for coal, uranium and electricity (about \$730 million in 1980 and \$1.7 billion by 1985) because of increasing imports of oil (about \$2.0 billion in 1980 and \$4.5 billion by 1985). These trade balances, which are based on the assumption of no further increase in real terms in OPEC prices, have been incorporated into the TRACE high-price energy projection.

The balance-of-trade projections for energy commodities have been derived by EMR from domestic supply-demand analyses presented in the Strategy paper for alternative scenarios. The demand projections are based on explicit assumptions about future demographic and economic activity, including future energy prices. They are described as internally consistent in

the sense that total energy requirements are first estimated for each end-use sector and then the demands for specific energy sources are determined on a 'market-share' basis. The sum of the energy sources equals total energy demands. The difference in methodology is said to account for the differences in demand estimates from those prepared earlier by the National Energy Board (1975a, 1975b).

CHART 2.2  
BALANCE-OF-TRADE IN ENERGY COMMODITIES  
(high-price scenario)



Source: Strategy (1976), p.113.

The 'high-price' scenario essentially involves domestic energy prices moving towards international levels. The 'low-price' scenario, in contrast, assumes no real change in the price of domestic oil, but does allow natural



gas to rise to commodity-equivalent value as in the high-price scenario.

On the supply side, the extent to which higher crude oil prices will lead to increased recovery of oil from known reservoirs is perhaps stated conservatively in the high-price scenario. In the low-price scenario there are no oil sands developments beyond those already underway. In the high-price scenario, one begins in 1982 and another in 1986.

The effect of demand in determining supply is most apparent in the case of electricity. Two growth cases are considered. In the high-growth case, electrical output is assumed to grow at about 7 per cent a year. This is essentially what current plans of provincial utilities call for. EMR believes this is unrealistically high, however, and so presents an alternative low-growth scenario at a rate of 5.5 per cent. The figure of \$91.2 billion (1975) dollars) included in the capital requirements chart reproduced earlier corresponds to this case. At the higher rate of growth, the amount could exceed \$130 billion over the next fifteen years. This special approach to electricity is taken because it is expected to increase as a proportion of our energy supplies and because costs of deferring or cancelling projects (in the event that demand does not grow as fast as 5.5 per cent) are small relative to the costs of accelerating production.

#### 2.4 WORLD TRADE OUTLOOK

According to Project LINK it is expected that world economic recovery will be somewhat stronger in 1977 than in 1976, and 1978 should bring a further round of improvement. This improvement in world trade is based to

some extent on presumed expansionary policies in the United States, Germany and Japan in 1977-78 which should lead to growth in total production in the main industrial countries. The overall rate of inflation should continue to moderate. The above average rates of inflation in Britain, Italy, France and Australia should be offset by the much reduced rates for Germany and the United States.

Turning to the longer-run outlook for world trade, however, it would appear that the rates of growth might slow down somewhat in the 1980s and may be in the neighbourhood of 4 per cent per year by the middle of the decade. The rate of inflation in the prices of internationally-traded goods might level out somewhere between 4 and 5 per cent per year.<sup>4</sup> Incorporating this assumption into the TRACE projection leads to a slowdown in the rate of growth of Canada's exports in the 1980s, such that by the middle of the decade the growth rate may be in the neighbourhood of 4 per cent per year. Since a large portion of Canada's exports are products of the resource industries, this slowdown in export growth will result in slower rates of growth for the resource industries.<sup>5</sup>

For the U.S. economy the assumption has been made<sup>6</sup> that the growth rate of real GNP will grow at rates between 3.0 and 3.5 per cent per year

---

4 These comments are based on an experimental reduced-form projection presented by L.R. Klein and A. Tishler at the eighth annual meeting of Project LINK in Venice, September, 1976.

5 Resource industries include agriculture.

6 The U.S. projection incorporated into the TRACE projection has been taken from The Data Resources U.S. Long-term Review, Summer, 1976. U.S. trade is weighted heavily in the export equations for Canada in the TRACE model.

during the 1980s and that the inflation rate in this period will slowly decline to about 3.5 per cent per year.

## 2.5 POPULATION AND LABOUR FORCE<sup>7</sup>

The size and age-sex structure of the Canadian population on which this projection is based is from a Canadian population projection model (Cohen, 1976) developed at the Institute for Policy Analysis specifically for this purpose. All such models estimate the population in any period by adding to the population in the previous period net additions. The four determinants of net additions are births, deaths, immigration and emigration. The model determines the number of births and deaths based on a pre-specified number of immigrants and emigrants. However, to determine the number of births, the overall period total fertility rate<sup>8</sup> must also be pre-specified. The choice of these pre-specified assumptions is an essential ingredient of the projection. Over the decade of the 1960s there was a rapid decline in the period total fertility rate in Canada as is apparent from the figures in Table 2.2. This decline has continued into the 1970s, but at a lower rate. For 1973 it has been estimated to be 1.93. This is below the replacement level which has been estimated by Statistics Canada to be 2.10<sup>9</sup>. For this projection it is assumed that the

---

7 A more detailed analysis of population trends was presented by Foot (1975a).

8 This is defined as the average number of births per woman over her child bearing years.

9 Population Projections for Canada and the Provinces, 1972-2001, Catalogue No. 91-514, p. 29.

TABLE 2.2  
PERIOD TOTAL FERTILITY RATE IN CANADA

<u>Year</u>	<u>Rate</u>
1950	3.43
1955	3.82
1960	3.91
1965	3.16
1970	2.31

Source: Statistics Canada, Catalogue No. 91-514, p. 35.

decline in the fertility rate will not continue but that a level below replacement will be maintained. More specifically a value of 2.00 has been maintained throughout the next fifteen years. It is probably worth pointing out that those born over this horizon do not enter the labour force source populations within the projection period.

The average annual level of gross immigration to Canada over the past two decades has been 151,350 persons as indicated by the figures in Table 2.3.

TABLE 2.3  
AVERAGE ANNUAL IMMIGRATION TO CANADA

<u>Period</u>	<u>Number</u>
1956-60	156,582
1961-65	99,758
1966-70	182,167
1971-75	166,890
Average	151,350

Source: Statistics Canada, Canadian Statistical Review, various issues.

The target level for the next fifteen years is still under review by the federal government. A number of countervailing forces will undoubtedly



determine the outcome, not the least of which are likely to be the domestic need to secure sufficient employment for Canadian residents and the likely international obligations and requests to continue to accept immigrants on humanitarian and other grounds. The final outcome is quite uncertain. Consequently, in the absence of further information, it has been assumed that the historically recorded levels provide some guide to possible future levels of gross immigration. More specifically a level of gross immigration of 150,000 persons has been assumed for these projections. Gross emigration is usually assumed to be 60,000 persons<sup>10</sup> and this is the figure assumed for these projections.

The population model embodies the option of starting the projections in 1971, the last Census year, or in 1974, the last year for which detailed Statistics Canada population estimates are currently available. The latter is chosen for this projection. The resulting total population together with the historical figures are outlined below. From these figures it is apparent that Canada is projected to have a total population of about just under twenty-eight million people by 1990, and that the lower growth rate will continue throughout the projection horizon.

Charts 2.3 and 2.4 portray the estimated age-sex composition in five-year age intervals of the Canadian population for 1975 and 1990. The contrast is clear. By 1990 the average age of the population will be much higher with an increasing proportion of people in the 65 and over age groups. This proportion is projected to rise from an estimated 8.5 per cent in 1975

---

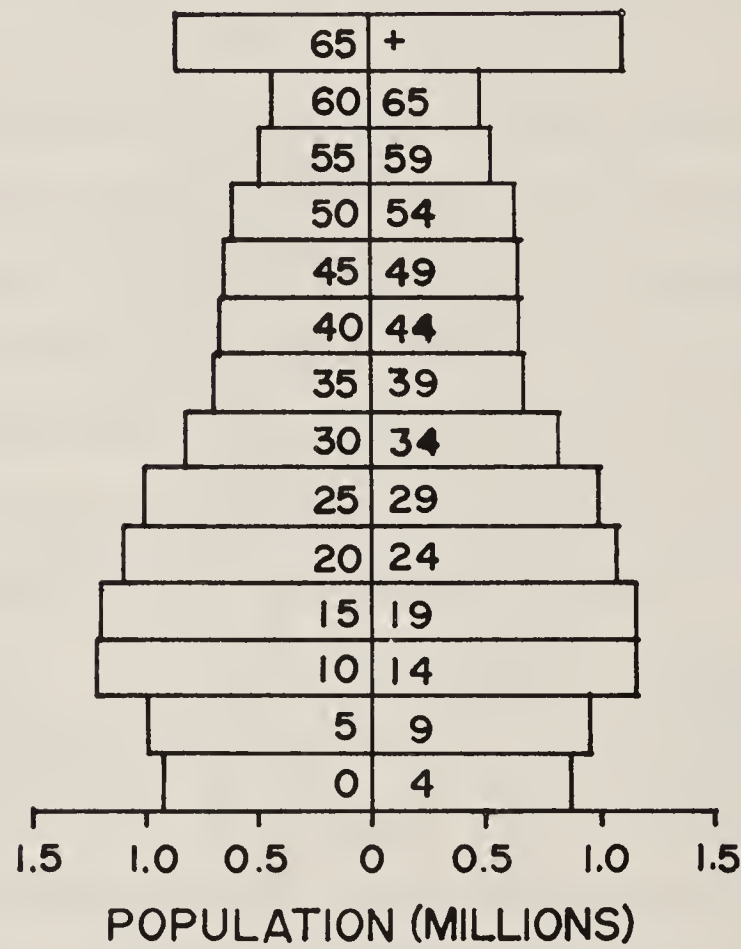
10 See for example Statistics Canada, 91-514, p. 46.



CHART 2.3

PROJECTED AGE STRUCTURE  
OF THE CANADIAN POPULATION

MALE



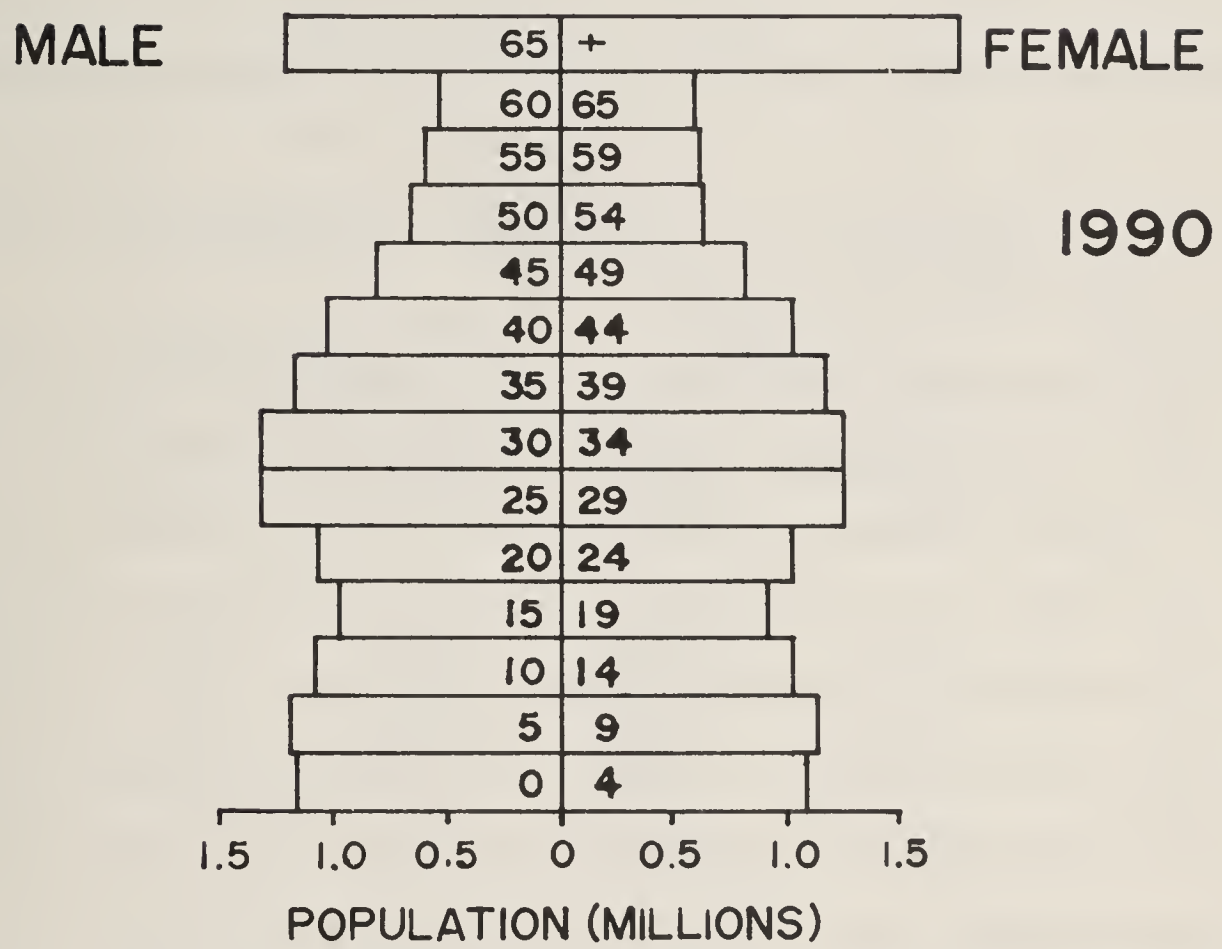
FEMALE

1975

Source: Institute for Policy Analysis

# CHART 2.4

## PROJECTED AGE STRUCTURE OF THE CANADIAN POPULATION



Source: Institute for Policy Analysis

TABLE 2.4  
POPULATION LEVELS AND GROWTH IN CANADA

<u>Year</u>	<u>Level (millions)</u>	<u>Average Annual Growth (Per Cent)</u>
1955	15.698	} 2.3
1965	19.644	
1975	22.800	} 1.5
1977	23.397	
1982	25.014	} 1.3
1987	26.675	
1990	27.763	} 1.3

Source: Statistics Canada, Canadian Statistical Review, various issues.

to 10.3 percent in 1990. In addition, it is worth noting that the absolute number of children (0 to 14 age group) does not continue to decrease over this period but actually increases as the two largest five-year cohorts move into the traditional child-bearing years.

However, of particular interest is the movement of the large population cohorts into the traditionally higher-participation labour force age groups. The 25 to 54 male age group has traditionally generated high (above 96 per cent) labour force participation and, over the projection horizon, there is a significant net addition to this age group. In fact, the two labour force source population variables in the TRACE model display contrasting behaviour over the projection horizon (Table 2.5). These figures show that the growth in the traditionally high labour force participation group (males 25 to 54 years) is projected to average well above two per cent over the next 10 years and be considerably higher than the remaining labour force source population group. This behaviour represents a complete reversal of this historical experience of the last two decades.

These trends, however, will be somewhat offset by opposite trends in the participation rates. The male, 25 to 54 participation rate is projected to continue on its gentle downward path while the participation rate for "all others, 14 years and over" is projected to continue to rise.

The overall effect on labour force growth is the product of these contrasting trends. The outcome is a projected slowing of labour force growth in Canada as indicated in Table 2.5. In summary, as a result of the demographic assumptions and the endogenously determined participation rates the labour force growth in Canada is projected to decline from the 3.5 per cent annual average of the last decade to about 2 per cent in the mid-1980s.

TABLE 2.5  
DETERMINANTS OF LABOUR FORCE GROWTH IN CANADA

Period	Labour Force Source Population Growth <sup>11</sup>		Participation Rates <sup>12</sup>		Labour Force Growth <sup>11</sup>
	Males 25-54 Years	All Others 14 Years & Over	Males 25-54 Years	All Others 14 Years & Over	Total
1955-60	2.0	2.4	97.3	37.2	2.7
1960-65	0.8	2.6	97.2	38.6	2.2
1965-70	1.9	3.0	96.6	41.8	3.2
1970-75	2.5	2.5	96.1	44.8	3.6
1975-77	2.1	2.3	94.5	49.7	2.3
1977-82	2.5	1.5	93.9	50.8	2.4
1982-87	2.4	0.7	94.7	52.8	2.0

Source: 1955-75, Statistics Canada, 1976-87, Institute for Policy Analysis

## 2.6 POTENTIAL OUTPUT

Potential output is a measure of the level of output an economy is capable of producing, given the labour force, the stock of capital, and the

<sup>11</sup> Average Annual Growth Rate (per cent)

<sup>12</sup> Average Annual Rate (per cent)

rate of technical change, assuming labour and capital are, in a macro-economic sense, fully employed and that a normal number of person-hours per week is worked. Thus, the rate at which potential output grows is determined by (1) the rate of growth in the labour force, (2) the average number of hours per week worked, (3) the rate of growth in the capital stock, (4) returns to scale and (5) the rate of "technical change". The term "technical change" is used to include the increases in output attributable to other factors such as innovations, managerial skills, and the shifting of resources from low productivity uses to high productivity uses.<sup>13</sup> Over the past two decades (see Chart 2.5) technical change accounted for 2.1 percentage points of the average increase in potential output in commercial nonagricultural industries of 5.5 per cent, or 38 per cent of the average increase in output. Increases in the capital stock accounted on average for about 1.9 percentage points, or 35 per cent of the average annual increase. Labour input (in person-hours) accounted for the remaining 27 per cent of the increase.

To estimate the growth of potential output in commercial nonagricultural industries<sup>14</sup> over the next decade, it is assumed that technical change continues to account for 2 percentage points of the increase in potential output. The projected levels of net investment from the TRACE model pro-

---

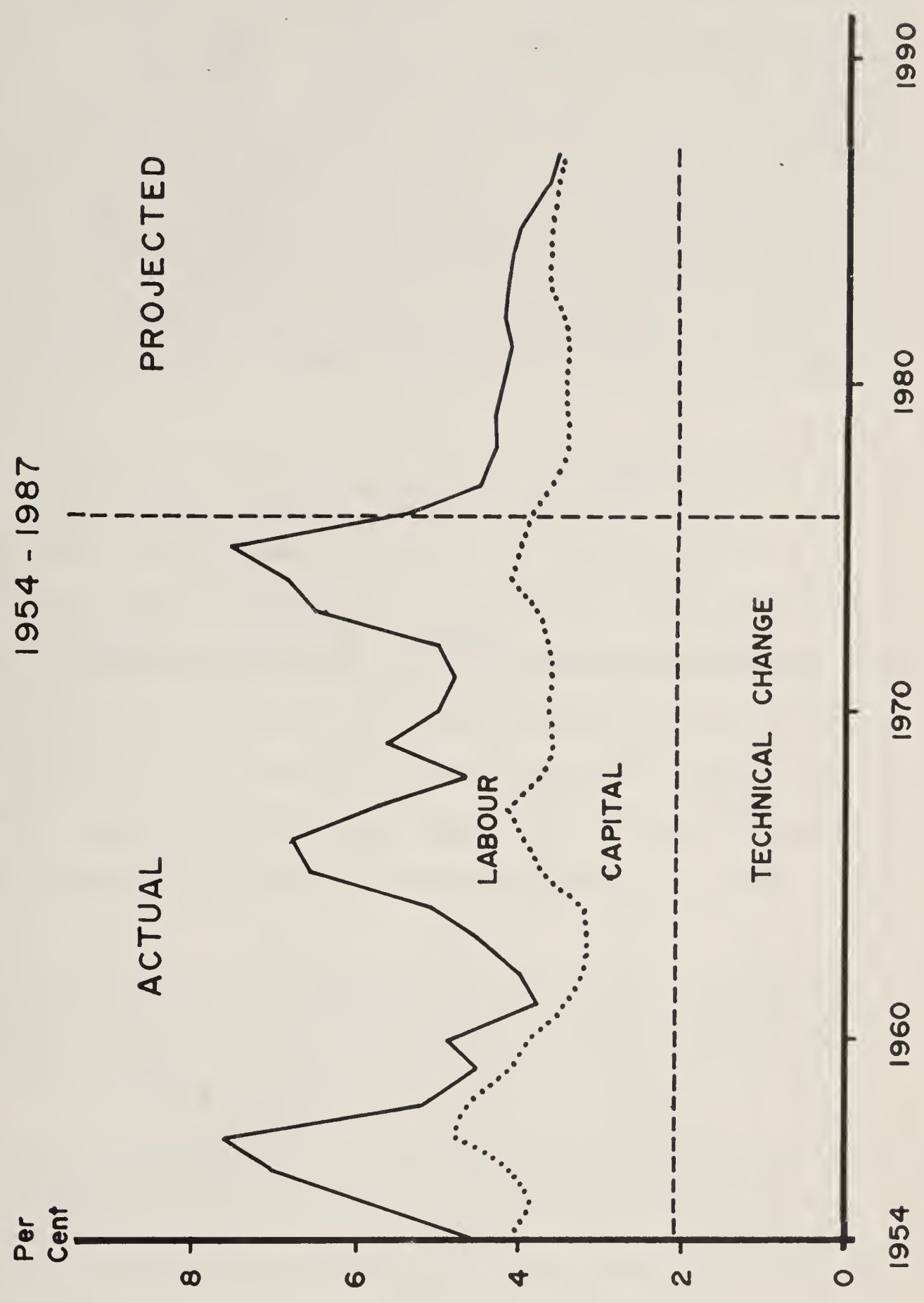
13 "Technical change" is a short-hand expression for any kind of a shift in the production function. See Solow (1957). It was assumed that returns to scale were constant and that technical change was factor neutral and occurred at a constant rate over time. See p.85.

14 This is the endogenous production sector of the TRACE model. The term "business sector" is often used to refer to the commercial industries.



CHART 2.5

SOURCES OF GROWTH IN POTENTIAL OUTPUT  
IN COMMERCIAL NON-AGRICULTURAL INDUSTRIES



Source: Institute for Policy Analysis

jection are used to calculate the additions to the capital stock.<sup>15</sup> The projected labour force, whose calculation was explained in the previous section, after an allowance for unemployment attributable to structural problems in labour markets,<sup>16</sup> working at "normal" hours<sup>17</sup> then gives the final input component to calculate potential output. Thus, the growth rate in potential output in the 1980s will be about one percentage point lower than in the period 1955-75 because of the projected lower rate of growth in the labour force and the lower rate of growth in nonenergy investments.

## 2.7 AGGREGATE DEMAND

In the TRACE model, actual output is compared with potential output to give an indication of the degree of tightness in labour and product markets and in order to provide a measure of the upward pressure on wages and prices.<sup>18</sup> In the TRACE model projections for the next decade, the level of actual output is less than potential output. That is, actual output is determined by demand factors rather than supply limitations. As noted above, however, aggregate demand and potential output are inter-related

---

15 Because substantial investments in energy are projected over the next decade and the fact that these investments would affect the capital-output ratio in a way that would destroy historical relationships, some (the exogenous portion) of these investments were treated as if they occurred in an "energy sector" that was separate from other business nonagricultural industries. See Appendix 2.1.

16 It was assumed for the purpose of calculating potential output that 5.5 per cent of the labour force was unemployed during the projection period for structural and other reasons unrelated to aggregate demand. For evidence that this rate has shifted upward in recent years see Rea (1977), Meltz and Reid (1976), and Grubel, Maki and Sax (1975).

17 Hours worked per week were assumed to decline at the same annual rate as during the past 20 years.

18 Potential output could also be used as a target output level for the economy. The unemployment rate used to define potential output may be set lower (e.g. at four per cent) in such a case.

because additions to the capital stock will affect the levels of both potential and actual output. Hence if investment is growing slowly, potential output will also grow slowly. Actual output cannot exceed potential output for long periods of time, although when there is an insufficiency of aggregate demand, aggregate demand may be well below potential for substantial periods. The growth rates for each of the real aggregate demand components for both the historical and projection period are shown in Table 2.6.

TABLE 2.6

GROWTH OF REAL GNP AND AGGREGATE DEMAND COMPONENTS  
Annual Average Growth Rate (per cent)

<u>Period</u>	<u>Personal Consumption</u>	<u>Business Fixed Capital Formation</u>	<u>Government Expenditure</u>	<u>Exports</u>	<u>Imports</u>	<u>GNP</u>
1955-60	4.76	2.30	2.40	3.21	3.29	3.93
1960-65	4.50	6.51	6.54	7.66	6.44	5.62
1965-70	4.37	3.28	6.59	11.0	7.80	4.78
1970-75	5.53	5.82	4.89	2.35	7.33	4.29
1975-77	5.17	1.48	2.05	7.03	6.04	4.52
1977-82	4.08	7.51	4.80	5.00	4.60	4.98
1982-87	4.24	2.43	4.95	4.22	4.18	3.97

Source: Table 2.12 and historical data

Note: Growth rates refer to growth from first year named to second year named.

Over the period 1955 to 1960 the strength in the economy came primarily

from the consumer sector. The growth over the subsequent decade was led by the export and government sectors. The period from 1965 to 1970 was one of slow growth for business investment, but over the period 1970 to 1975 this has been the dominant growth component followed by the consumer sector. The relative weakness of the export sector completely reversed the pattern of the previous decade.

Over the projection period there is also some shifting in the importance of the aggregate demand components. Over the period 1977 to 1982 the major source of strength is business investment expenditures, reflecting the energy investment boom. Both personal consumption and government expenditures are sources of steady growth but are not providing the stimulus to enable the economy to reach its potential. The growth in exports is moderate reflecting a projected tendency for the growth in world trade to slow down after 1978. Energy investments are assumed to peak towards the middle of the period 1982 to 1987 and the latter part of this period reflects a sharp drop-off in investment expenditure. This drop off in 1986 is shown in Chart 2.1 and in Table A2.2. The projection simply reflects this. Given that the economy is operating below the level of potential output at this time, there are no large investment projects in other sectors of the economy waiting for resources to be released from the energy sector. Hence the slack is not taken up. Unless a stimulus to aggregate demand comes from another source, there may be strong recessionary tendencies in the economy following the end of the energy investment boom. If, however, the energy investments were spread out over a longer period and not clustered so much in the early part of the 1980s, this tendency to a recession might



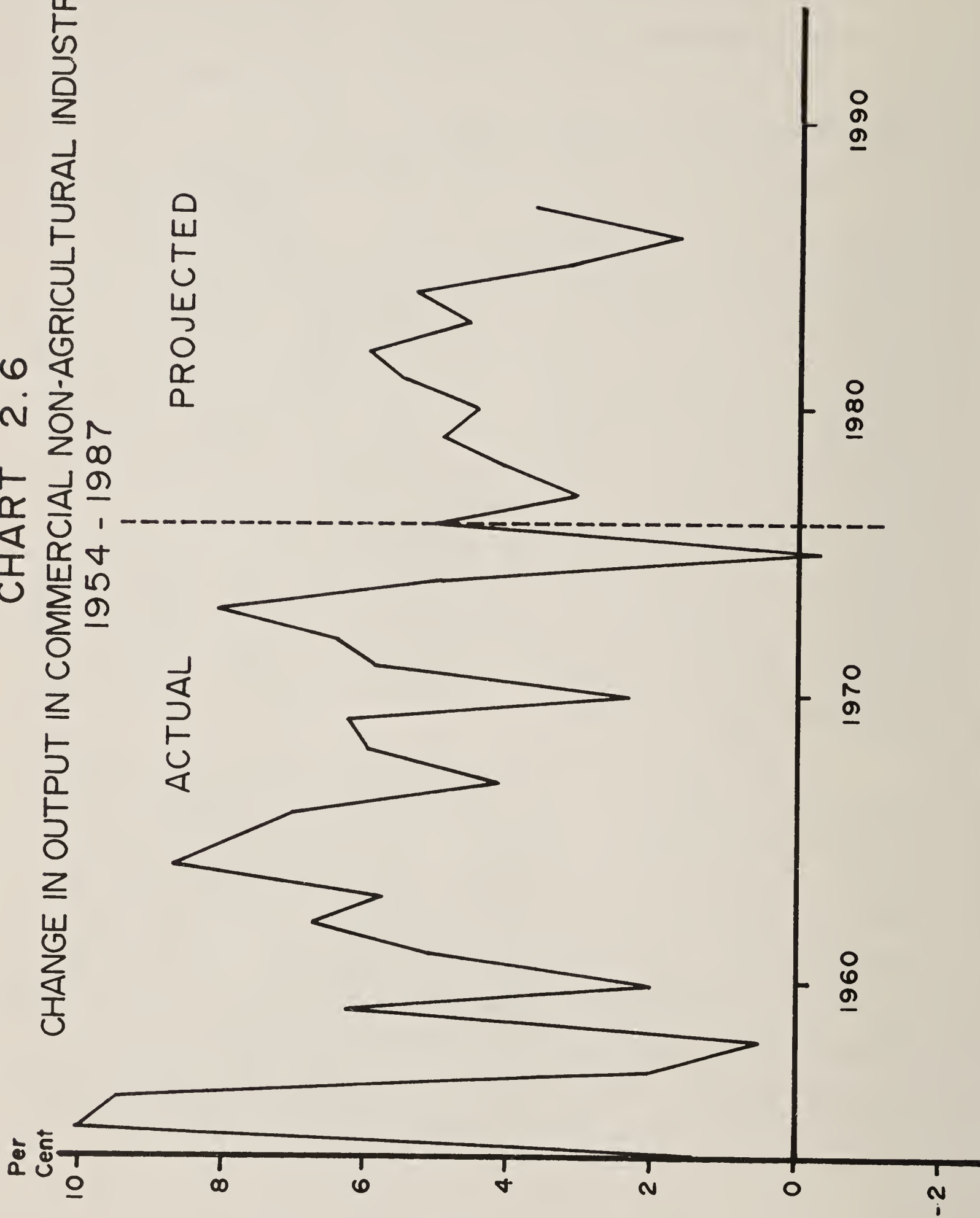
disappear. The cost of this, however, would probably be a slower rate of growth during the early parts of the 1980s.

## 2.8 AGGREGATE OUTPUT, WAGES AND PRICES

Although during the period of the energy investment boom the rates of growth in actual output may exceed the rate of growth in potential output, these growth rates are not likely to be sufficiently high to raise the level of output to the level of potential output. In other words, the economy may not completely recover from the recession of 1975 and be left in a position where the utilization rate (the ratio of actual to potential output) in the commercial nonagricultural industries remains below the average of 95 per cent which existed over the period 1955 to 1975. The failure of the economy to return to potential output levels after the 1975 recession is in marked contrast (see Chart 2.6) to 1955-56, 1964-65 or 1973. In those years the gap between potential and actual output created by the earlier recessions was closed.

If this under-utilisation of available resources continues throughout the coming decade, the upward pressure that would be exerted on prices in the 1980s would be somewhat reduced. In this situation, substantial energy investments may occur without the pressures of a fully employed economy emerging. This, coupled with the assumed lower rate of growth in the prices of internationally traded goods, means that the rate of inflation, as measured by the GNP deflator, declines slowly but steadily throughout the projection period. The assumption of stability in the price of inter-

CHART 2.6  
CHANGE IN OUTPUT IN COMMERCIAL NON-AGRICULTURAL INDUSTRIES  
1954 - 1987



nationally traded goods, of course, implicitly assume no repetition of the unusual conditions in commodity markets that contributed to the double-digit inflation of the early 1970s. Thus, although the money supply adjusts to maintain a constant income velocity of money in the TRACE projection, the absence of any period in which aggregate demand substantially exceeds potential output means that aggregate demand pressures do not exert major inflationary pressure. Prices increase in response to the rate of change in world prices and to increases in normal unit labour costs. In the absence of any reliable way of predicting the behaviour of wage rates in the public sector, the projection has assumed that wage rate increases in the government sector are at the same rate as those in the commercial sector.

The rate of increase in average labour productivity in the commercial non-agricultural industries (measured on a potential output basis) is in the 3 to 3.5 per cent range during the decade beyond 1977, while the rate of increase in money wage rates, although fluctuating somewhat, is about 7 per cent. The rate of increase in normal unit labour costs is therefore in the 3 to 3.5 per cent range during this period. Given that the rates of increase in prices of world-traded goods in the projection are about 4.5 to 5 per cent, the rate of increase in the prices of goods and services in the commercial nonagricultural industries is about 3.5 to 4 per cent during most of the decade. The rate slows down somewhat towards the end of the decade reflecting the end of the energy investment boom.

## 2.9 INDUSTRY OUTPUT AND EMPLOYMENT

Although the energy investment boom provides stimulus to goods-

producing industries, the general tendency that has been apparent over the past two decades towards an increased share in output by the service industries continues.<sup>19</sup> As can be seen from Table 2.7 the share of the goods-producing industries falls from a level of 39 per cent in 1975 to 37.7 per cent in 1982 and falls further to 35.7 per cent by 1987. The decreasing share of manufacturing industries contributes particularly to this change in the industrial structure. On the service side of the economy, it is the commercial service industries that play an increasing role.<sup>20</sup>

TABLE 2.7

CANADA: INDUSTRIAL DISTRIBUTION OF OUTPUT  
(per cent)

	<u>1975</u>	<u>1977</u>	<u>1982</u>	<u>1987</u>
Goods Industries	39.0	38.4	37.7	35.7
Resource Industries <sup>21</sup>	6.8	6.8	6.6	6.3
Manufacturing	22.4	22.1	21.4	20.2
Construction	6.9	6.7	7.1	6.6
Other	2.9	2.8	2.6	2.5
Service Industries	61.0	61.6	62.3	64.3
Commercial Services	42.2	43.1	44.1	45.3
Government Sector	15.8	15.4	15.1	15.7
Other	3.0	3.1	3.1	3.3
	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Source: Table 2.14

19 The method of obtaining the industrial distribution of output and employment is described in Appendix 6.1.

20 The industries shown are defined to contain only commercial establishments. All non-commercial establishments are contained in either the government or personal sector. This definition of commercial industries follows that used by Statistics Canada in its publications 14-201 and 61-005.

21 Including agriculture.



TABLE 2.8

CANADA: INDUSTRIAL DISTRIBUTION OF EMPLOYMENT  
(per cent)

	<u>1975</u>	<u>1977</u>	<u>1982</u>	<u>1987</u>
Goods Industries	33.2	31.9	28.9	25.1
Resource Industries <sup>22</sup>	7.3	7.1	6.4	5.3
Manufacturing	19.3	18.5	16.2	13.7
Construction	5.8	5.6	5.8	5.7
Other	0.8	0.7	0.5	0.4
Service Industries	66.8	68.1	71.1	74.9
Commercial Services	40.2	41.1	41.0	40.6
Government Sector	20.3	20.3	22.6	25.7
Other	6.3	6.7	7.5	8.6
	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Source: Table 2.15

---

22 Including agriculture

These shifts in the relative importance of industrial divisions, together with the fact that productivity growth has tended to be strongest in the goods-producing industries, give rise to the fact that an increasing proportion of the labour force will be employed in the service industries. Indeed, a slight decline in employment in manufacturing industries is possible since the overall demand for goods is increasing at a lower rate than that of service industries while at the same time productivity growth is assumed to continue at higher rates in the goods-producing industries. Thus, as Table 2.8 shows, increasing proportions of workers are projected to be employed in the service industries.

#### 2.10 PERSONAL INCOME

Although the projection is characterised by a significant slowing in the rate of real economic growth relative to the average performance of the past two decades, real personal disposable income per person continues to rise. This can be seen in Table 2.9. The growth rate was abnormally high in the early 1970s. Apart from that, the average growth rate over the next decade is not markedly different from that of earlier periods. The reason is, of course, that the slower economic growth is due in large part to the slower rate of population growth. Hence, personal income per person is not affected as much as would otherwise have been the case.

#### 2.11 BALANCE OF INTERNATIONAL PAYMENTS

On current account, deficits are expected throughout most of the

TABLE 2.9  
PERSONAL DISPOSABLE INCOME PER PERSON<sup>23</sup>

<u>Year</u>	<u>Real Personal Disposable Income (millions of 1971 dollars)</u>	<u>Total Population (thousands)</u>	<u>Real PDI Per Person (\$)</u>	<u>Growth (per cent)</u>
1955	27,901	15,689	1,778	} 1.66
1960	34,500	17,864	1,931	
1965	44,361	19,650	2,258	} 3.18
1970	56,331	21,316	2,643	
1975	78,017	22,780	3,425	} 3.20
1977	85,610	23,399	3,659	
1982	104,363	25,014	4,172	} 5.32
1987	126,334	26,675	4,736	

Source: Tables 2.13, 3 and historical data.

---

23 Three-year average centered in the year shown for the row.

decade. These result mainly from the large volume of imports associated with the energy investment boom, tourist and travel expenditures abroad, and the continued and growing outflow of interest and dividends associated with the past financing of Canadian investment, during a period in which exports of goods are only expected to grow at moderate rates. The capital account is very difficult to forecast. Undoubtedly, there will be substantial inflows of capital associated with the energy investment boom. Whether these will be sufficient, at present levels of the foreign exchange rate, to cover the current account deficit is uncertain. Indeed, it is even possible that net capital inflows could more than offset the current account deficit at that exchange rate. Given this uncertainty, rather than make a forecast, the projection has been made on the assumption of a Canadian dollar that is at parity with the United States dollar. In Chapter Four, the question of financing capital expenditures is discussed further.

## 2.12 SUMMARY

The pattern of economic activity for the next decade will be shaped mainly by the level and timing of energy investments. The projection of the Canadian economy presented in this chapter is in large part no more than a translation using the TRACE model of the implications of the high-price energy scenario depicted in An Energy Strategy for Canada for the Canadian economy as a whole. To the extent that the projection shows a marked cyclical pattern during the next decade, this reflects the pattern depicted in Chart 2.1 which shows the energy investments as envisaged by the



Department of Energy, Mines and Resources. A change in the timing or level of energy investments will change the economic profile of the next decade.

Apart from the energy investments, there appear to be two striking characteristics of the next decade. The first is that the lower rate of growth in population will mean a lower rate of growth in the labour force and in potential output. The second is that, apart from the period in which the energy investment boom is at its height, there is a tendency towards an insufficiency of aggregate demand and towards higher than normal unemployment rates. Despite these trends, however, real personal disposable income per person will grow at rates between 2 and 3 per cent per year so that, on average, standards of living will continue to rise at rates not very different from the rates during the 1950s and 1960s.

It should be remembered, however, that this projection has been deliberately made on the basis of no policy changes in order to focus attention on possible policy issues. A reduction in tax rates would be one way of providing more stimulus. The effects of a cut in personal income taxes are discussed in Chapter Seven. Alternatively, policies to stimulate private investment or to increase the provision of social capital could be used to increase aggregate demand. The projections of Chapter Two suggest that it is stimulative policies that should be considered for the next decade in order that the economy achieves its potential. In the event, of course, that world trade, or another determinant of aggregate demand, grows more rapidly than foreseen in the projection, such stimulative policies might be unnecessary.



## Tables 2.10 - 2.15

High-price Energy  
Projections for Canada  
1975-1987

From the TRACE Model Mk IVD  
Institute for Policy Analysis  
University of Toronto

Note: The concepts and definitions in these Tables  
are identical with those used by Statistics  
Canada in the "System of National Accounts".

TABLE 2.10

SUMMARY OF PROJECTION

	1976	1977	1978	1979	1980	1981
PERCENTAGE RATES OF GROWTH						
GNP IN CURRENT DOLLARS	15.0	11.1	10.7	10.4	9.5	9.4
GNP IN CONSTANT (1971) DOLLARS	5.1	4.0	4.3	5.0	4.9	5.2
IMPLICIT PRICE INDEX OF GNP	9.5	6.8	6.2	5.2	4.3	4.0
PERSONAL EXPENDITURE ON CONSUMER GOODS & SERVICES IN CONSTANT DOLLARS	5.6	4.8	4.1	3.7	3.9	4.2
GOVERNMENT EXPENDITURE ON GOODS & SERVICES IN CONSTANT DOLLARS*	1.2	2.9	4.5	4.6	5.1	4.9
BUSINESS FIXED CAPITAL FORMATION IN CONSTANT DOLLARS	2.9	0.1	4.2	9.0	6.1	8.5
EXPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	9.7	4.4	4.7	5.0	5.4	5.0
IMPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	8.3	3.8	4.1	4.7	3.9	4.8
WAGE RATES IN BUSINESS NON AGRICULTURE	11.0	9.1	8.2	7.0	6.4	6.0
NORMAL UNIT LABOUR COSTS IN BUSINESS NON AGRICULTURE	7.7	5.8	5.0	3.8	3.2	2.9

\* EXOGENOUS



TABLE 2.10

## SUMMARY OF PROJECTION (CONT.)

	1982	1983	1984	1985	1986	1987
	PERCENTAGE RATES OF GROWTH					
GNP IN CURRENT DOLLARS	9.7	9.2	9.7	8.4	7.2	8.3
GNP IN CONSTANT (1971) DOLLARS	5.5	4.6	5.2	3.6	2.5	3.9
IMPLICIT PRICE INDEX OF GNP	3.9	4.3	4.3	4.6	4.6	4.2
PERSONAL EXPENDITURE ON CONSUMER GOODS & SERVICES IN CONSTANT DOLLARS	4.5	4.3	4.5	4.3	3.9	4.2
GOVERNMENT EXPENDITURE ON GOODS & SERVICES IN CONSTANT DOLLARS*	4.9	4.9	4.9	5.0	5.0	5.0
BUSINESS FIXED CAPITAL FORMATION IN CONSTANT DOLLARS	9.7	6.0	9.0	1.3	-5.3	1.2
EXPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	4.8	4.6	4.3	4.3	4.3	3.7
IMPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	5.5	4.9	5.9	4.2	2.5	3.4
WAGE RATES IN BUSINESS NON AGRICULTURE	6.2	7.1	7.1	7.3	7.4	6.9
NORMAL UNIT LABOUR COSTS IN BUSINESS NON AGRICULTURE	2.9	3.5	3.5	3.7	3.6	3.2

\* EXOGENOUS

TABLE 2.10

## SUMMARY OF PROJECTION (CONT.)

	1975	1976	1977	1978	1979	1980	1981
	PER CENT						
UNEMPLOYMENT RATE	7.07	7.14	7.50	8.12	8.12	7.99	7.53
UTILISATION RATE	92.0	92.1	91.1	90.9	91.3	91.5	92.5
CANADA TREASURY BILLS (3 MONTHS)	7.90	9.15	8.67	6.62	5.93	5.27	5.08
GOVT. OF CANADA BONDS (10 YEARS & OVER)	9.12	9.25	8.67	8.18	8.39	8.44	7.82
PERSONAL SAVING RATE	10.68	8.42	8.46	8.54	8.41	8.25	8.17
	CANADIAN \$ PER U.S. \$						
FOREIGN EXCHANGE RATE*	1.02	0.98	0.99	1.00	1.00	1.00	1.00
	BILLIONS OF DOLLARS						
CHANGE IN OFFICIAL INTERNATIONAL RESERVES	-0.38	0.04	-0.13	-0.18	0.09	0.09	0.04
CURRENT ACCOUNT BALANCE OF INTERNATIONAL PAYMENTS	-4.39	-4.23	-3.39	-3.12	-3.06	-1.88	-1.67
GOVERNMENT SURPLUS OR DEFICIT	-5.31	-2.07	-1.03	-1.13	-0.55	0.27	1.21

\* EXOGENOUS

TABLE 2.10

SUMMARY OF PROJECTION (CONT.)

	1982	1983	1984	1985	1986	1987
	PER CENT					
UNEMPLOYMENT RATE	6.89	6.45	5.93	5.86	6.18	6.13
UTILISATION RATE	93.8	94.1	95.1	94.5	93.2	93.4
CANADA TREASURY BILLS (3 MONTHS)	4.94	5.21	5.33	5.50	5.54	5.39
GOVT. OF CANADA BONDS (10 YEARS & OVER)	7.41	7.44	7.43	7.37	7.38	7.46
PERSONAL SAVING RATE	8.28	8.05	7.93	7.56	6.90	6.55
	CANADIAN \$ PER U.S. \$					
FOREIGN EXCHANGE RATE*	1.00	1.00	1.00	1.00	1.00	1.00
	BILLIONS OF DOLLARS					
CHANGE IN OFFICIAL INTERNATIONAL RESERVES	0.02	0.08	-0.05	0.01	-0.00	0.01
CURRENT ACCOUNT BALANCE OF INTERNATIONAL PAYMENTS	-2.08	-2.36	-3.77	-3.71	-0.99	0.46
GOVERNMENT SURPLUS OR DEFICIT	2.19	2.96	4.17	3.12	0.17	-1.08

\* EXOGENOUS

TABLE 2.11

GROSS NATIONAL EXPENDITURE IN CURRENT DOLLARS (BILLIONS)

	1975	1976	1977	1978	1979	1980	1981
PERSONAL CONSUMPTION EXPENDITURES, TOTAL	94.867	108.513	119.006	130.638	142.394	153.945	166.280
	( 14.39)	( 9.67)	( 9.77)	( 9.77)	( 9.00)	( 8.11)	( 8.01)
DURABLE GOODS	14.644	16.167	17.523	18.820	20.171	21.419	22.826
	( 10.40)	( 8.39)	( 7.40)	( 7.40)	( 7.17)	( 6.19)	( 6.57)
OTHER CONSUMER GOODS AND SERVICES	80.223	92.346	101.485	111.818	122.223	132.526	143.454
	( 15.11)	( 9.90)	( 10.18)	( 10.18)	( 9.31)	( 8.43)	( 8.25)
GOVERNMENT CURRENT	32.629	36.472	40.755	45.796	50.906	56.495	62.397
	( 11.78)	( 11.74)	( 12.37)	( 12.37)	( 11.16)	( 10.98)	( 10.45)
GROSS FIXED CAPITAL FORMATION	6.548	7.272	8.038	8.902	9.838	10.725	11.745
	( 11.05)	( 10.54)	( 10.75)	( 10.75)	( 10.52)	( 9.01)	( 9.51)
BUSINESS GROSS FIXED CAPITAL FORMATION, TOTAL	32.252	36.116	38.701	42.278	47.880	52.363	58.722
	( 11.98)	( 7.16)	( 9.24)	( 9.24)	( 13.25)	( 9.36)	( 12.14)
RESIDENTIAL CONSTRUCTION	8.394	10.548	10.898	11.202	11.607	12.382	13.219
	( 25.67)	( 3.32)	( 2.79)	( 2.79)	( 3.61)	( 6.68)	( 6.76)
NON-RESIDENTIAL CONSTRUCTION	11.093	12.317	13.055	14.485	16.596	18.304	21.546
	( 11.03)	( 6.00)	( 10.95)	( 10.95)	( 14.57)	( 10.29)	( 17.71)
MACHINERY AND EQUIPMENT	12.766	13.251	14.747	16.591	19.678	21.677	23.957
	( 3.80)	( 11.29)	( 12.50)	( 12.50)	( 18.61)	( 10.16)	( 10.52)
VALUE OF PHYSICAL CHANGE IN INVENTORIES	-0.424	0.866	1.184	1.200	1.434	1.626	1.859
GOVERNMENT	0.031	0.0	0.0	0.0	0.0	0.0	0.0
BUSINESS NON-FARM	-0.517	0.866	1.184	1.200	1.434	1.626	1.859
FARM AND GRAIN IN COMMERCIAL CHANNELS	0.062	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 2.11 (CONT.)  
GROSS NATIONAL EXPENDITURE IN CURRENT DOLLARS (BILLIONS)

	1982	1983	1984	1985	1986	1987
PERSONAL CONSUMPTION EXPENDITURES, TOTAL	179.871 ( 8.17)	195.048 ( 8.44)	211.755 ( 8.57)	229.686 ( 8.47)	247.765 ( 7.87)	266.391 ( 7.52)
DURABLE GOODS	24.520 ( 7.42)	26.092 ( 6.41)	27.897 ( 6.92)	29.621 ( 6.18)	31.112 ( 5.03)	32.918 ( 5.81)
OTHER CONSUMER GOODS AND SERVICES	155.351 ( 8.29)	168.956 ( 8.76)	183.858 ( 8.82)	200.064 ( 8.81)	216.653 ( 8.29)	233.473 ( 7.76)
GOVERNMENT CURRENT	68.964 ( 10.52)	76.772 ( 11.32)	85.462 ( 11.32)	95.396 ( 11.62)	106.551 ( 11.69)	118.499 ( 11.21)
GROSS FIXED CAPITAL FORMATION	12.905 ( 9.88)	14.133 ( 9.51)	15.521 ( 9.82)	17.001 ( 9.54)	18.513 ( 8.89)	20.255 ( 9.41)
BUSINESS GROSS FIXED CAPITAL FORMATION, TOTAL	66.703 ( 13.59)	73.191 ( 9.73)	82.710 ( 13.01)	86.947 ( 5.12)	85.143 ( -2.07)	89.167 ( 4.73)
RESIDENTIAL CONSTRUCTION	14.137 ( 6.94)	15.110 ( 6.88)	16.148 ( 6.87)	17.304 ( 7.16)	18.463 ( 6.70)	19.705 ( 6.73)
NON-RESIDENTIAL CONSTRUCTION	24.940 ( 15.75)	27.759 ( 11.31)	32.356 ( 16.56)	33.216 ( 2.66)	29.528 ( -11.10)	30.089 ( 1.90)
MACHINERY AND EQUIPMENT	27.626 ( 15.31)	30.322 ( 9.76)	34.206 ( 12.81)	36.427 ( 6.49)	37.153 ( 1.99)	39.373 ( 5.98)
VALUE OF PHYSICAL CHANGE IN INVENTORIES	2.146	2.102	2.369	1.918	1.164	1.447
GOVERNMENT	0.0	0.0	0.0	0.0	0.0	0.0
BUSINESS NON-FARM	2.146	2.102	2.369	1.918	1.164	1.447
FARM AND GRAIN IN COMMERCIAL CHANNELS	0.0	0.0	0.0	0.0	0.0	0.0



TABLE 2.11 (CONT.)  
GROSS NATIONAL EXPENDITURE IN CURRENT DOLLARS (BILLIONS)

	1975	1976	1977	1978	1979	1980	1981
EXPORTS, TOTAL	40.422	45.539	50.813	56.560	62.091	68.315	74.785
MERCHANDISE	( 12.66)	( 11.58)	( 11.31)	( 10.02)	( 9.78)	( 10.02)	( 9.47)
SERVICES	33.730	38.236	42.692	47.550	52.213	57.548	63.117
	( 13.36)	( 11.65)	( 11.38)	( 10.22)	( 9.81)	( 10.22)	( 9.68)
	6.692	7.302	8.121	9.011	9.878	10.767	11.669
	( 9.11)	( 11.21)	( 10.96)	( 9.62)	( 9.62)	( 9.00)	( 8.37)
IMPORTS, TOTAL	45.307	50.353	54.855	60.415	65.973	71.109	77.475
MERCHANDISE	( 11.14)	( 8.94)	( 10.14)	( 9.20)	( 7.79)	( 8.95)	( 8.95)
SERVICES	33.751	37.616	40.749	44.859	48.917	52.542	57.196
	( 11.45)	( 8.33)	( 10.09)	( 9.05)	( 7.41)	( 8.86)	( 8.86)
	11.556	12.737	14.106	15.556	17.056	18.567	20.279
	( 10.22)	( 10.75)	( 10.28)	( 9.64)	( 8.86)	( 9.22)	( 9.22)
RESIDUAL ERROR OF ESTIMATE	-0.150	0.510	1.730	2.430	2.430	2.430	2.430
STATISTICAL DISCREPANCY	-0.003	0.001	0.001	0.018	0.014	0.016	0.017
GROSS NATIONAL PRODUCT	160.834	184.936	205.375	227.407	251.014	274.807	300.760
	( 14.99)	( 11.05)	( 10.73)	( 10.38)	( 9.48)	( 9.44)	( 9.44)
GROSS DOMESTIC PRODUCT	145.410	167.296	185.541	205.787	226.503	246.814	269.946
	( 15.05)	( 10.91)	( 10.91)	( 10.91)	( 10.07)	( 8.97)	( 9.37)

NOTE - PERCENTAGE CHANGES ARE WRITTEN IN PARENTHESES

TABLE 2.11 (CONT.)  
GROSS NATIONAL EXPENDITURE IN CURRENT DOLLARS (BILLIONS)

	1982	1983	1984	1985	1986	1987
EXPORTS, TOTAL	81.662	88.907	96.407	104.452	112.884	120.897
MERCHANDISE	( 9.19)	( 8.87)	( 8.44)	( 8.35)	( 8.07)	( 7.10)
SERVICES	69.045	75.310	81.780	88.734	96.060	102.947
	( 9.39)	( 9.07)	( 8.59)	( 8.50)	( 8.26)	( 7.17)
	12.617	13.597	14.627	15.718	16.824	17.949
	( 8.13)	( 7.77)	( 7.57)	( 7.46)	( 7.04)	( 6.69)
IMPORTS, TOTAL	84.878	92.539	101.595	109.748	115.621	122.357
MERCHANDISE	( 9.56)	( 9.03)	( 9.79)	( 8.02)	( 5.35)	( 5.83)
SERVICES	62.777	68.487	75.376	81.307	84.969	89.384
	( 9.76)	( 9.10)	( 10.06)	( 7.87)	( 4.50)	( 5.20)
	22.101	24.052	26.219	28.441	30.652	32.973
	( 8.98)	( 8.83)	( 9.01)	( 8.48)	( 7.77)	( 7.57)
RESIDUAL ERROR OF ESTIMATE	2.430	2.430	2.430	2.430	2.430	2.430
STATISTICAL DISCREPANCY	0.017	0.018	0.015	0.016	0.014	0.010
GROSS NATIONAL PRODUCT	329.820	360.062	395.074	428.099	458.844	496.740
	( 9.66)	( 9.17)	( 9.72)	( 8.36)	( 7.18)	( 6.26)
GROSS DOMESTIC PRODUCT	296.173	322.913	354.013	382.807	409.394	442.903
	( 9.72)	( 9.03)	( 9.63)	( 8.13)	( 6.95)	( 8.18)

NOTE - PERCENTAGE CHANGES ARE WRITTEN IN PARENTHESES

TABLE 2.12  
GROSS NATIONAL EXPENDITURE IN CONSTANT(1971)DOLLARS (BILLIONS)

	1975	1976	1977	1978	1979	1980	1981
PERSONAL CONSUMPTION EXPENDITURES, TOTAL	69.589	73.480	76.972	80.152	83.124	86.348	89.936
DURABLE GOODS	11.858	12.442	13.172	13.716	14.024	14.458	15.056
SEMI-DURABLE GOODS	8.790	9.234	9.590	9.922	10.252	10.596	10.964
NON-DURABLE GOODS	21.089	22.250	23.208	24.116	25.030	25.986	27.008
SERVICES	27.852	29.554	31.002	32.398	33.818	35.309	36.907
	( 6.11)	( 4.90)	( 4.50)	( 4.38)	( 4.41)	( 4.53)	
GOVERNMENT							
CURRENT EXPENDITURE ON GOODS AND SERVICES	21.810	22.062	22.711	23.722	24.805	26.061	27.339
GROSS FIXED CAPITAL FORMATION	4.256	4.299	4.480	4.756	5.010	5.277	5.559
	( 1.01)	( 4.22)	( 6.17)	( 5.33)	( 5.33)	( 5.33)	( 5.34)
BUSINESS GROSS FIXED CAPITAL FORMATION, TOTAL	21.529	22.144	22.169	23.109	25.194	26.723	28.985
RESIDENTIAL CONSTRUCTION	5.007	5.638	5.394	5.252	5.161	5.282	5.396
NON-RESIDENTIAL CONSTRUCTION	7.608	7.617	7.628	8.130	8.846	9.404	10.616
MACHINERY AND EQUIPMENT	8.915	8.890	9.148	9.728	11.187	12.037	12.972
	( -0.28)	( 2.90)	( 6.34)	( 15.01)	( 7.60)	( 7.77)	
VALUE OF PHYSICAL CHANGE IN INVENTORIES	-0.325	0.377	0.687	0.656	0.745	0.810	0.890
GOVERNMENT	0.016	0.0	0.0	0.0	0.0	0.0	0.0
BUSINESS NON-FARM	-0.351	0.537	0.687	0.656	0.745	0.810	0.890
FARM AND GRAIN IN COMMERCIAL CHANNELS	0.010	-0.160	0.0	0.0	0.0	0.0	0.0

TABLE 2.12 (CONT.)

## GROSS NATIONAL EXPENDITURE IN CONSTANT(1971)DOLLARS (BILLIONS)

	1982	1983	1984	1985	1986	1987
PERSONAL CONSUMPTION EXPENDITURES, TOTAL	94.002 ( 4.52)	98.069 ( 4.33)	102.478 ( 4.50)	106.849 ( 4.27)	111.034 ( 3.92)	115.657 ( 4.16)
DURABLE GOODS	15.843 ( 5.22)	16.550 ( 4.46)	17.367 ( 4.94)	18.083 ( 4.12)	18.655 ( 3.16)	19.432 ( 4.16)
SEMI-DURABLE GOODS	11.368 ( 3.69)	11.778 ( 3.60)	12.214 ( 3.70)	12.652 ( 3.59)	13.077 ( 3.36)	13.528 ( 3.45)
NON-DURABLE GOODS	28.131 ( 4.16)	29.278 ( 4.08)	30.502 ( 4.18)	31.744 ( 4.07)	32.965 ( 3.85)	34.264 ( 3.94)
SERVICES	38.660 ( 4.75)	40.463 ( 4.66)	42.394 ( 4.77)	44.369 ( 4.66)	46.336 ( 4.43)	48.433 ( 4.53)
GOVERNMENT						
CURRENT EXPENDITURE ON GOODS AND SERVICES	28.683 ( 4.92)	30.099 ( 4.94)	31.588 ( 4.95)	33.155 ( 4.96)	34.805 ( 4.98)	36.541 ( 4.99)
GROSS FIXED CAPITAL FORMATION	5.856 ( 5.35)	6.170 ( 5.35)	6.500 ( 5.36)	6.849 ( 5.36)	7.217 ( 5.37)	7.605 ( 5.37)
BUSINESS GROSS FIXED CAPITAL FORMATION, TOTAL	31.806 ( 9.73)	33.703 ( 5.96)	36.748 ( 9.04)	37.218 ( 1.28)	35.232 ( -5.34)	35.651 ( 1.19)
RESIDENTIAL CONSTRUCTION	5.511 ( 2.13)	5.626 ( 2.08)	5.741 ( 2.04)	5.856 ( 2.00)	5.971 ( 1.96)	6.086 ( 1.92)
NON-RESIDENTIAL CONSTRUCTION	11.743 ( 10.62)	12.540 ( 6.79)	13.982 ( 11.49)	13.775 ( -1.48)	11.830 ( -14.12)	11.577 ( -2.14)
MACHINERY AND EQUIPMENT	14.551 ( 12.17)	15.536 ( 6.77)	17.025 ( 9.59)	17.587 ( 3.30)	17.431 ( -0.89)	17.989 ( 3.20)
VALUE OF PHYSICAL CHANGE IN INVENTORIES	0.989	0.928	1.003	0.777	0.451	0.538
GOVERNMENT	0.0	0.0	0.0	0.0	0.0	0.0
BUSINESS NON-FARM	0.989	0.928	1.003	0.777	0.451	0.538
FARM AND GRAIN IN COMMERCIAL CHANNELS	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 2.12 (CONT.)  
GROSS NATIONAL EXPENDITURE IN CONSTANT(1971)DOLLARS (BILLIONS)

	1975	1976	1977	1978	1979	1980	1981
EXPORTS, TOTAL	23.751	26.053	27.192	28.477	29.898	31.518	33.107
MERCHANDISE	( 9.69)	( 4.37)	( 4.37)	( 4.72)	( 4.99)	( 5.42)	( 5.04)
SERVICES	19.199	21.428	22.383	23.422	24.668	26.018	27.364
	( 11.61)	( 4.46)	( 4.64)	( 5.32)	( 5.47)	( 5.17)	( 5.17)
	4.552	4.626	4.809	5.055	5.230	5.500	5.743
	( 1.61)	( 3.96)	( 5.11)	( 3.47)	( 5.15)	( 4.42)	( 4.42)
IMPORTS, TOTAL	29.575	32.028	33.246	34.605	36.236	37.641	39.449
MERCHANDISE	( 8.30)	( 3.80)	( 4.09)	( 4.09)	( 4.71)	( 3.88)	( 4.80)
SERVICES	21.509	23.383	24.337	25.411	26.650	27.694	29.086
	( 8.71)	( 4.08)	( 4.41)	( 4.41)	( 4.88)	( 3.92)	( 5.03)
	8.066	8.646	8.909	9.194	9.586	9.947	10.363
	( 7.19)	( 3.04)	( 3.20)	( 3.20)	( 4.26)	( 3.76)	( 4.18)
RESIDUAL ERROR OF ESTIMATE	-0.060	0.200	0.270	0.160	0.160	0.160	0.160
GROSS NATIONAL PRODUCT	110.976	116.587	121.236	126.428	132.700	139.256	146.527
	( 5.06)	( 3.99)	( 4.28)	( 4.28)	( 4.96)	( 4.94)	( 5.22)
GROSS DOMESTIC PRODUCT	96.795	101.606	104.775	109.077	114.222	119.272	125.491
	( 4.97)	( 3.12)	( 4.11)	( 4.11)	( 4.72)	( 4.42)	( 5.21)

NOTE - PERCENTAGE CHANGES ARE WRITTEN IN PARENTHESES



TABLE 2.12 (CONT.)  
GROSS NATIONAL EXPENDITURE IN CONSTANT(1971)DOLLARS (BILLIONS)

	1982	1983	1984	1985	1986	1987
EXPORTS, TOTAL	34.699	36.280	37.855	39.467	41.147	42.661
MERCHANDISE	( 4.81)	( 4.55)	( 4.34)	( 4.26)	( 4.26)	( 3.68)
SERVICES	28.728	30.102	31.478	32.900	34.388	35.698
	( 4.98)	( 4.78)	( 4.57)	( 4.52)	( 4.52)	( 3.81)
	5.971	6.178	6.377	6.567	6.759	6.963
	( 3.98)	( 3.46)	( 3.23)	( 2.98)	( 2.92)	( 3.01)
IMPORTS, TOTAL	41.616	43.649	46.223	48.170	49.354	51.051
MERCHANDISE	( 5.49)	( 4.89)	( 5.90)	( 4.21)	( 2.46)	( 3.44)
SERVICES	30.820	32.387	34.421	35.852	36.559	37.768
	( 5.96)	( 5.08)	( 6.28)	( 4.16)	( 1.97)	( 3.31)
	10.796	11.262	11.802	12.318	12.794	13.283
	( 4.18)	( 4.32)	( 4.79)	( 4.38)	( 3.86)	( 3.82)
RESIDUAL ERROR OF ESTIMATE	0.160	0.160	0.160	0.160	0.160	0.160
GROSS NATIONAL PRODUCT	154.579	161.759	170.109	176.304	180.691	187.761
	( 5.50)	( 4.64)	( 5.16)	( 3.64)	( 2.49)	( 3.91)
GROSS DOMESTIC PRODUCT	132.562	138.584	145.685	150.676	154.059	160.026
	( 5.63)	( 4.54)	( 5.12)	( 3.43)	( 2.24)	( 3.87)

NOTE - PERCENTAGE CHANGES ARE WRITTEN IN PARENTHESES

TABLE 2.13  
NATIONAL AND PERSONAL INCOME

	1975	1976	1977	1978	1979	1980	1981
	BILLIONS OF CURRENT DOLLARS						
WAGES SALARIES AND SUPPLEMENTARY LABOUR INCOME	88.713	100.533	111.356	122.195	133.513	145.214	157.931
MILITARY PAY AND ALLOWANCES	1.324	1.470	1.604	1.735	1.855	1.974	2.093
CORPORATION PROFITS BEFORE TAXES AND BEFORE DIVIDENDS PAID TO NON-RESIDENTS	18.052	21.788	24.158	27.710	31.454	34.824	39.422
INVENTORY VALUATION ADJUSTMENT OTHER INCOME	-4.186	-3.646	-2.922	-2.902	-2.632	-2.374	-2.357
NET NATIONAL INCOME	21.010	23.545	24.887	27.763	30.152	32.028	34.420
INDIRECT TAXES LESS SUBSIDIES	124.913	143.690	159.082	176.501	194.342	211.666	231.509
CAPITAL CONSUMPTION ALLOWANCES AND MISCELLANEOUS VALUATION ADJUSTMENTS	17.971	21.286	25.086	27.931	31.190	35.033	38.340
RESIDUAL ERROR OF ESTIMATE	17.800	18.45	17.85	11.34	11.67	12.32	9.44
GROSS NATIONAL PRODUCT	17.800	20.469	22.936	25.405	27.912	30.537	33.341
PERSONAL INCOME	0.150	15.00	12.05	10.76	9.87	9.41	9.18
PERSONAL DISPOSABLE INCOME	160.834	184.936	205.375	227.407	251.014	274.807	300.760
PERSONAL DISPOSABLE INCOME IN CONSTANT (1971) DOLLARS	133.467	150.041	164.442	180.863	196.968	212.785	230.059
PERSONAL SAVING	108.376	120.797	132.526	145.594	158.464	171.030	184.609
PERSONAL SAVING RATIO (PER CENT)	79.501	81.797	85.715	89.319	92.498	95.924	99.842
	11.570	10.168	11.209	12.440	13.330	14.102	15.081
	10.676	8.417	8.458	8.544	8.412	8.245	8.169
		(-21.15)	( 0.48)	( 1.02)	( -1.55)	( -1.98)	( -0.92)

NOTE - PERCENTAGE CHANGES ARE WRITTEN IN PARENTHESES

TABLE 2.13 (CONT.)  
NATIONAL AND PERSONAL INCOME

	1982	1983	1984	1985	1986	1987
	BILLIONS OF CURRENT DOLLARS					
WAGES SALARIES AND SUPPLEMENTARY LABOUR INCOME	172.375 ( 9.15)	188.931 ( 9.60)	207.171 ( 9.65)	226.466 ( 9.31)	246.087 ( 8.66)	267.175 ( 8.57)
MILITARY PAY AND ALLOWANCES	2.223 ( 6.19)	2.380 ( 7.09)	2.548 ( 7.06)	2.735 ( 7.34)	2.937 ( 7.38)	3.140 ( 6.90)
CORPORATION PROFITS BEFORE TAXES AND BEFORE DIVIDENDS PAID TO NON-RESIDENTS	44.922 ( 13.95)	49.184 ( 9.49)	55.148 ( 12.13)	58.424 ( 5.94)	59.698 ( 2.18)	64.749 ( 8.46)
INVENTORY VALUATION ADJUSTMENT	-2.480	-2.905	-3.125	-3.520	-3.784	-3.659
OTHER INCOME	37.128 ( 7.87)	39.380 ( 6.06)	42.073 ( 6.84)	43.919 ( 4.39)	44.823 ( 2.06)	46.617 ( 4.00)
NET NATIONAL INCOME	254.168 ( 9.79)	276.970 ( 8.97)	303.815 ( 9.69)	328.024 ( 7.97)	349.761 ( 6.63)	378.022 ( 8.08)
INDIRECT TAXES LESS SUBSIDIES	41.714 ( 8.80)	45.806 ( 9.81)	50.363 ( 9.95)	55.260 ( 9.72)	60.078 ( 8.72)	65.158 ( 8.46)
CAPITAL CONSUMPTION ALLOWANCES AND MISCELLANEOUS VALUATION ADJUSTMENTS	36.368 ( 9.08)	39.717 ( 9.21)	43.326 ( 9.09)	47.245 ( 9.05)	51.434 ( 8.87)	55.991 ( 8.86)
RESIDUAL ERROR OF ESTIMATE	-2.430	-2.430	-2.430	-2.430	-2.430	-2.430
GROSS NATIONAL PRODUCT	329.820 ( 9.66)	360.062 ( 9.17)	395.074 ( 9.72)	428.099 ( 8.36)	458.844 ( 7.18)	496.740 ( 8.26)
PERSONAL INCOME	249.676 ( 8.53)	270.718 ( 8.43)	294.118 ( 8.64)	318.479 ( 8.28)	342.010 ( 7.39)	367.388 ( 7.42)
PERSONAL DISPOSABLE INCOME	199.966 ( 8.32)	216.312 ( 8.17)	234.546 ( 8.43)	253.399 ( 8.04)	271.461 ( 7.13)	290.868 ( 7.15)
PERSONAL DISPOSABLE INCOME IN CONSTANT (1971) DOLLARS	104.497 ( 4.66)	108.751 ( 4.07)	113.500 ( 4.37)	117.873 ( 3.85)	121.647 ( 3.20)	126.278 ( 3.81)
PERSONAL SAVING	16.558 ( 9.80)	17.413 ( 5.16)	18.599 ( 6.81)	19.148 ( 2.96)	18.726 ( -2.21)	19.065 ( 1.81)
PERSONAL SAVING RATIO (PER CENT)	8.281 ( 1.36)	8.050 ( -2.78)	7.930 ( -1.50)	7.557 ( -4.70)	6.898 ( -8.71)	6.554 ( -4.98)

NOTE - PERCENTAGE CHANGES ARE WRITTEN IN PARENTHESES

TABLE 2.14

CANADA : REAL DOMESTIC PRODUCT BY INDUSTRY  
(MILLIONS OF 1971 DOLLARS)

	1975	1976	1977	1978	1979	1980	1981
AGRICULTURE, FISHING, & TRAPPING	2394	2418	2454	2491	2528	2566	2605
FORESTRY	672	740	768	808	856	907	967
MINES, QUARRIES & OIL WELLS	3540	3823	3939	4105	4308	4519	4770
MANUFACTURING	21654	22635	23116	23853	24872	25770	26939
CONSTRUCTION	6669	6982	6997	7277	7662	8054	8701
ELECTRICAL POWER, GAS & WATER UTILITIES	2802	2910	2980	3065	3163	3260	3377
TOTAL : GOODS INDUSTRIES	37732	39510	40258	41602	43392	45079	47362
COMMERCIAL SERVICE INDUSTRIES	40831	43392	45181	47279	49714	52113	55036
PERSONAL SECTOR	2943	3090	3245	3407	3578	3756	3944
GOVERNMENT SECTOR	15286	15612	16090	16786	17535	18321	19147
TOTAL : SERVICE INDUSTRIES	59061	62096	64516	67473	70828	74192	78128
TOTAL : ALL INDUSTRIES	96794	101606	104774	109076	114221	119271	125491

TABLE 2.14 (CONT.)

CANADA : REAL DOMESTIC PRODUCT BY INDUSTRY  
(MILLIONS OF 1971 DOLLARS)

	1982	1983	1984	1985	1986	1987
AGRICULTURE, FISHING, & TRAPPING	2644	2684	2724	2765	2806	2848
FORESTRY	1033	1087	1149	1191	1219	1266
MINES, QUARRIES & OIL WELLS	5041	5267	5523	5698	5817	6016
MANUFACTURING	28364	29403	30716	31372	31545	32373
CONSTRUCTION	9365	9864	10596	10739	10324	10543
ELECTRICAL POWER, GAS & WATER UTILITIES	3512	3627	3757	3858	3940	4063
TOTAL : GOODS INDUSTRIES	49962	51934	54467	55624	55654	57112
COMMERCIAL SERVICE INDUSTRIES	58443	61376	64770	67371	69431	72581
PERSONAL SECTOR	4142	4349	4566	4795	5034	5286
GOVERNMENT SECTOR	20014	20924	21880	22884	23937	25045
TOTAL : SERVICE INDUSTRIES	82599	86649	91216	95051	98404	102913
TOTAL : ALL INDUSTRIES	132562	138584	145684	150675	154058	160025



TABLE 2.15  
CANADA : EMPLOYMENT BY INDUSTRY  
(THOUSANDS)

	1975	1976	1977	1978	1979	1980	1981
AGRICULTURE, FISHING, & TRAPPING	500	500	500	500	500	500	500
FORESTRY	68	72	73	73	74	76	77
MINES, QUARRIES & OIL WELLS	119	123	123	122	122	122	123
MANUFACTURING	1799	1809	1795	1772	1772	1768	1771
CONSTRUCTION	540	552	546	553	567	583	613
ELECTRICAL POWER, GAS & WATER UTILITIES	72	70	69	67	65	63	62
TOTAL : GOODS INDUSTRIES	3101	3129	3108	3088	3102	3114	3148
COMMERCIAL SERVICE INDUSTRIES	3756	3895	4000	4067	4162	4265	4380
PERSONAL SECTOR	587	616	647	680	713	749	787
GOVERNMENT SECTOR	1895	1913	1973	2065	2163	2266	2374
TOTAL : SERVICE INDUSTRIES	6238	6425	6621	6812	7040	7281	7542
TOTAL : ALL INDUSTRIES	9340	9554	9729	9901	10142	10396	10691

TABLE 2.15 (CONT.)  
CANADA : EMPLOYMENT BY INDUSTRY  
(THOUSANDS)

	1982	1983	1984	1985	1986	1987
AGRICULTURE, FISHING, & TRAPPING	500	500	500	500	500	500
FORESTRY	79	80	80	80	79	79
MINES, QUARRIES & OIL WELLS	124	124	123	122	120	118
MANUFACTURING	1783	1778	1776	1752	1707	1673
CONSTRUCTION	642	661	689	686	650	644
ELECTRICAL POWER, GAS & WATER UTILITIES	61	59	58	56	55	53
TOTAL : GOODS INDUSTRIES	3189	3203	3228	3198	3113	3069
COMMERCIAL SERVICE INDUSTRIES	4514	4629	4741	4837	4906	4974
PERSONAL SECTOR	826	867	911	956	1004	1054
GOVERNMENT SECTOR	2487	2606	2731	2861	2998	3142
TOTAL : SERVICE INDUSTRIES	7829	8104	8384	8655	8909	9171
TOTAL : ALL INDUSTRIES	11018	11307	11612	11854	12022	12241



## ENERGY PROJECTIONS

## A2.1 INVESTMENT

This projection embodies the high-price energy investment profile presented in the figure in Chart 2.1 which is reproduced from Energy, Mines and Resources' recent publication An Energy Strategy for Canada. This profile is based on an energy investment bill for Canada of \$181 billion in constant 1975 dollars over the period 1976-1990. Applying the relevant price indexes to the respective totals shows that this energy investment bill amounts to \$128.4 billion in constant 1971 dollars, the base used in the TRACE model.

Some of this investment will be endogenously generated in the projection since the model is estimated on historical data which include investment in the energy sector. To obtain an approximate measure of this endogenous contribution the average proportion of investment in the fuel and power sector<sup>1</sup> to total non-residential business investment was calculated over the past two decades for which data were available.

The results are shown in Table A2.1.

These figures suggest that roughly one quarter of total non-residential business investment has been devoted to energy projects over the past two decades and consequently suggest that approximately one quarter of this investment generated in the projection will be devoted to this purpose. The difference between the endogenously generated totals and the projected requirements must then be exogenously added to the solution to obtain a projection consistent with the adopted energy profile. Since the exogenous investment will itself

---

1 These are defined to be petroleum and gas mining, electric power utilities, gas distribution and the manufacturing of petroleum and gas products.

have multiplier effects, which imply the generation of additional energy investment, the estimate of the amount of exogenous investment can only be accomplished in the context of the resulting solution.

TABLE A2.1

INVESTMENT IN THE FUEL AND POWER SECTORS AS A PER CENT  
OF TOTAL NONRESIDENTIAL BUSINESS INVESTMENT

<u>Period</u>	<u>Average Per Cent</u>
1955-59	24.8
1960-64	20.8
1965-69	22.6
1970-74	26.4
1955-74	23.7

---

Source: Statistics Canada 61-205,  
Various issues, Table 3.

Following these guidelines, it appeared that approximately sixty per cent of the energy requirements were endogenously generated during the period 1976-1990. Consequently, the balance was added exogenously to the projection. The figures for 1977-1987 are shown in Table A2.2. To keep comparability with the capital-output relations of the historical period from which parameter estimates were derived, these exogenous investments were excluded from the capital stock of the business nonagricultural sector.

An estimate of the exogenous capital inflows associated with energy investments was added to the endogenously generated capital flows.



TABLE A2.2

ESTIMATED ENERGY - RELATED CAPITAL REQUIREMENTS, 1977-1987  
HIGH-PRICE SCENARIO

	<u>Endogenously Generated</u>	<u>Exogenous Addition</u>	<u>Total</u>	<u>Proportion of Gross National Product</u>
	-	billions of 1971 dollars	-	per cent
1977	3.59	1.50	5.09	4.2
1978	3.81	1.60	5.41	4.3
1979	4.08	2.70	6.78	5.1
1980	4.18	3.65	7.83	5.6
1981	4.52	4.30	8.82	6.0
1982	5.04	4.80	9.84	6.4
1983	5.28	5.60	10.88	6.7
1984	5.59	7.20	12.79	7.5
1985	5.85	6.45	12.30	7.0
1986	6.05	3.50	9.55	5.3
1987	6.29	2.85	9.14	4.9
	<hr/>	<hr/>	<hr/>	
Total:	54.28	44.15	98.43	

NOTE: The total investment figures in column 3 were estimated from Chart 2.1 (page 27) and converted to 1971 dollars.

## A2.2 ROYALTIES AND SUBSIDIES

The rate of increase in total oil and gas royalties was based on projections made by the Economic Council of Canada<sup>2</sup>. The 1974 total has been extended at this rate through 1985, the end of the Council's projection period. The resulting ratios of royalties to domestic supply (in the high-price scenario of Energy, Mines and Resources Canada) for the period 1980 through 1985 were examined to establish a basis for extrapolation through 1987. In the case of natural gas the average ratio was used; the ratio for oil was allowed to increase at an annual rate of 5 per cent, as it had essentially done over the previous half decade.

As Canadian oil prices rise towards international levels, oil import compensation payments will decrease. On the assumption parity is achieved by 1980, the payments will cease in that year. Thus the subsidies have a decreasing trend to 1980 reflecting this anticipated development.

## A2.3 PRICE INDEXES FOR IMPORTS AND EXPORT OF MINERAL FUELS AND LUBRICANTS

Figures were not available for 1975 on the basis used in this study. A price index for imports of fuels and lubricants is published in the Bank of Canada Review, Table 76. For 1974 this index had a value of 370.7 compared to 336.5 for our index. Both are based on 1971 = 100. For 1975 the index in the Bank of Canada Review had a value of 473.1. The factor  $1.275 = (473.1/370.7)$  was therefore applied to the 1974 index to get a value of 429.0 for 1975.

---

2 Economic Council of Canada, Twelfth Annual Review, Appendix A, Chart A-5, page 133. Values for the Council's 'high-price' scenario which assumes a 5 per cent per year increase in the international price for crude oil from 1975 on have been used.

For subsequent years, this index was tied to inflation in the United States (which could also be interpreted as a proxy for changes in OPEC prices), and movements in the exchange rate according to the following formula:<sup>3</sup>

$$PM3G(t) = 4.3 * \frac{UPGNP(t)}{UPGNP(75)} * \frac{FXSU(t)}{FXSU(75)}$$

There was not a comparable price index available for exports of mineral fuels and lubricants, as there was for imports from the Bank of Canada Review, as described above. The factor 1.275 derived from the import price index was applied to the price index for exports, valued at 308.4 in 1974, to derive a value of 398.2 for 1975. Increases in the prices of exports of natural gas are anticipated. The Strategy paper (p. 112), envisaged the export price of natural gas adjusting to commodity-value with imported crude oil in U.S. markets by mid-1977. Similarly, The Twelfth Annual Review of the Economic Council of Canada Assumed this price would rise from \$1.60/Mcf to commodity-value with oil for export in 1977.

---

3 This formula has implications essentially consistent with the following estimate in the Strategy paper (p. 112): "For an increase of \$1.00 per barrel over current levels in international oil prices, the deficit on oil would be larger by \$160 million in 1980 and about \$350 million in 1985". Expressed in 1975 dollars, these differences represent 8 per cent of the deficits (\$2.0 billion and \$4.5 billion, respectively) in each case, while on a delivered-price of \$13.00 per barrel the one dollar increment is also 8 per cent. This zero-elasticity of demand is common to their estimate and our formula. UPGNP is the United States real gross national product and FXSU is the foreign exchange rate in Canadian dollars per U.S. dollar.

TABLE A2.3  
ENERGY EXPORTS

	billions of 1971 dollars			billions of 1975 dollars		
	Table 14 <sup>4</sup>	Unadjusted <sup>5</sup>	Total <sup>6</sup>	Crude Oil <sup>7</sup>	Natural Gas <sup>8</sup>	Other <sup>8</sup>
1976	1.471	1.497	5.882	2.183	1.700	1.999
1977	1.185	1.275	5.010	1.219	1.892	1.899
1978	1.057	1.214	4.773	0.759	2.115	1.899
1979	0.990	1.136	4.463	0.451	2.115	1.899
1980	1.006	1.155	4.538	0.256	2.048	2.234
1981	1.003	1.152	4.527	0.085	2.014	2.428
1982	0.995	1.142	4.490	0.000	1.868	2.622
1983	1.028	1.180	4.639	0.000	1.823	2.816
1984	1.071	1.230	4.833	0.000	1.823	3.010
1985	1.114	1.279	5.027	0.000	1.823	3.204
1986	1.136	1.304	5.124	0.000	1.823	3.301
1987	1.087	1.248	4.906	0.000	1.508	3.398

4 Per release May 16, 1976.

5 Values exceed those in column 1 by the following factors: 1976(1.018 = 4.000/3.93), 1977(1.076 = 4.23/3.93), 1978 and thereafter (1.148 = 4.51/3.93) reflecting assumed upward adjustments in the real price of natural gas exports, as discussed above.

6 Values exceed those in column 2 by the factor 3.93, the value of the energy export price index we estimated for 1975.

7 Assumed price is \$13.00/barrel. Except for 1976 the volume figures are estimated from a graph, Figure 21, page 46, in Canadian Oil: Supply and Requirements, National Energy Board, September 1975: 257, 160, 95, 54 and 18 thousand barrels per day. A 1976 volume of 460 was taken from the estimate reported in Oil, Natural Gas and Coal, Occasional Paper, Vol. 5, No. 1, March 1976, Toronto-Dominion Bank (p. 4), based on the observation that the currently authorized level of 510 will be reduced again July 1st.

8 As discussed above, we have assumed the average price for exported natural gas to be (per thousand cubic feet) \$1.70 in 1976, \$1.95 in 1977 and \$2.25 thereafter. Export demand was estimated from Figure 21, page 84, of the Strategy paper, with actual exports reduced by 60 per cent of the shortfall from 1977 through 1982. This scaling procedure is consistent with the approach taken by the Economic Council of Canada in its Twelfth Annual Review to reflect announced Federal policy.



## Footnotes to Table A2.3 - continued

- 9 Includes a constant value of \$0.622 billion 1975 dollars throughout, representing the actual 1975 sum of exports of refined petroleum products (\$0.3214b) and liquified petroleum gases (\$0.3008). The remainder relates to electricity, coal and uranium. Figure 33 on page 113 of the Strategy paper shows a surplus of about \$500 million for 1976. We were advised that this was based on a near-balance in coal, and surplus of about \$200 million in uranium, \$300 million in electricity. Electricity exports evidently doubled in volume and increased by fifty per cent in price so that the 1976 value would be about \$313 million compared with about \$104 million in 1975. We also applied the fifty per cent price increase to 1975 coal imports of \$576 million to arrive at \$864 million for 1976 and set exports at the same level to reflect the near balance. We valued uranium exports at the full projected surplus of \$200 million. With a base thus established at \$1.377 (1975 dollars) for 1976, on the assumption of no further change in imports, we used the projected balances from Figure 33 of the Strategy paper to estimate exports through 1985. Linear interpolation between 1980 and 1985 was at annual increments of \$194 million. Beyond 1985 we reduced these by half to \$97 million.



TABLE A2.4  
ENERGY IMPORTS

	<u>billions of 1971 dollars</u>	<u>billions of 1975 dollars</u>	
	<u>Table 14</u> <sup>10</sup>	<u>Total</u> <sup>11</sup>	<u>Crude Oil</u> <sup>12</sup>
1976	1.043	4.487	3.330
1977	0.889	3.823	2.666
1978	0.875	3.763	2.606
1979	0.897	3.855	2.698
1980	0.874	3.760	2.603
1981	0.915	3.933	2.776
1982	0.977	4.202	3.045
1983	1.106	4.757	3.600
1984	1.263	5.431	4.274
1985	1.396	6.005	4.848
1986	1.328	5.711	4.554
1987	1.137	4.890	3.733

<sup>10</sup> Per release, May 16, 1976.

<sup>11</sup> Values exceed those in column (1) by the factor 4.3, the estimated value of the price index for energy imports in 1975. Values exceed those in column (3) by a constant \$1.157 throughout, representing the sum of 1975 imports of petroleum products (0.275) for which we are not projecting any change, and our estimates for 1976 coal and electricity imports (\$0.882) which we do not subsequently change either. As explained in note (6) to the Export Table, we applied a fifty per cent price increase to 1975 exports to arrive at 1976 estimates of \$864 million for coal and \$18 million for electricity.

<sup>12</sup> Based on the Strategy paper. The estimated balance for 1975 in Table 16, page 113, implies that the category includes refined products and liquified petroleum gases (for which categories values are presented in Table 8 of Annex III on page 165). In effect the balances projected in Figure 33 on page 113 are net of the surplus in petroleum products. Since we are not projecting any change in this surplus, we have added the 1975 value of \$0.347 billion throughout arriving at our figures. The rest of the calculation proceeded as follows: From 1976 through 1980 the trade deficits in Figure 33 of the Strategy paper (0.8, 1.1, 1.5, 1.9 and 2.0 billions in each of these years) were augmented by our export estimates to arrive at gross imports. From 1981 on, we estimated the volume of domestic shortfall from the domestic demand and supply graph, Figure 20 on page 83, in conjunction with Table 13 on page 81 of the Strategy paper.

## THE TRACE MODEL

The TRACE model is a medium-size annual econometric model of the Canadian economy developed at the Institute for Policy Analysis of the University of Toronto. TRACE has undergone a number of revisions since the first version was completed in 1968. The version of TRACE used for projections in this study is known as TRACE Mk IVD<sup>1</sup>. The parameter estimates are based mainly on the annual National Accounts data through 1974 (released in December, 1975 by Statistics Canada). The period used for estimation varied somewhat, although most equations are estimated for the period 1954-74. The method of estimation was ordinary least squares<sup>2</sup>. The National Accounts data were based on 1971 constant dollars and, hence, the model is in these terms.

The demand side of the TRACE model follows the conventional breakdown into personal consumption, government expenditures, investment, plus exports minus imports. All government expenditure on goods and services is exogenous in constant dollars while wage rates and prices paid by government for purchased goods and services are endogenous and change in proportion to the

- 
- 1 TRACE Mk I was described in Choudhry, Kotowitz, Sawyer and Winder (1972) and TRACE Mk IIIR in Sawyer (1974). Interim versions of Mk IV have been used since November, 1975 as the final version of the Mk IV version of the model is still evolving. Mk IVD has been in use since November, 1976. The results of the Comparative Models Project presented at the meetings of the Canadian Economics Association at Université Laval in June, 1976 were based on TRACE Mk IVA while those presented at the meeting of Project LINK in Venice in September, 1976 were based on Mk IVC. The response of Mk IVD will differ somewhat from that of Mk IVC.
  - 2 TRACE Mk I was estimated by two-stage least squares using principal components of the predetermined variables at the first stage. Subsequent versions were, however, estimated by ordinary least squares. The experiment of Joseph Nehlawi (1977) suggests that this may have been the best method of estimation.

change in wages and prices in the business sector. The consumer durable goods equation is a stock-adjustment equation in which the real rate of interest enters as a variable. Expenditure on nondurable goods and services is explained by a modified permanent-income-hypothesis equation. The investment equations for machinery and equipment and non-residential construction expenditures are neoclassical equations based on a Cobb-Douglas production function. The real rate of interest enters as part of the rental price of capital goods. Residential construction is explained by a stock-adjustment equation which also involves the real rate of interest. Inventory investment is explained by a stock-adjustment equation involving a desired stock-sales ratio based on a moving average of past ratios. Exports and imports of goods are disaggregated according to four SITC categories for the purpose of Project LINK. Relative price changes affect imports while the supply of some categories of exports respond to changing profit margins. Exports respond to changes in the level of economic activity abroad while imports react to changes in domestic economic activity. Real gross national product at market prices is arrived at by summing the expenditure components.

There is a single endogenous production sector in TRACE, the business non-agricultural sector. Production and employment in agriculture and in the government and personal sectors are determined exogenously. Output (gross domestic product at factor cost) originating in the business non-agricultural sector is determined residually by subtracting exogenous output in agriculture, government and the personal sector and real indirect taxes less subsidies from gross domestic product at market prices.

A Cobb-Douglas production function is used in the business non-agricultural sector to estimate potential output and the ratio of actual to

potential output is used as the indicator of the degree of slack in the economy. The production function is of the form

$$\left(\frac{q}{n}\right)_t = e^{\alpha + \gamma t + \lambda h} \left(\frac{ck}{n}\right)_t^{1-\beta}$$

where  $q$  is gross value added (before deduction of capital consumption allowances)

$n$  is actual manhours of labour input

$k$  is the capital stock at the beginning of the period (including residential structures)

$t$  is time and is a proxy for "technical change"

$c$  is a capacity utilization variable,  $0 \leq c \leq 1$ , which indicates the degree to which the existing stock of capital is utilized

$h$  is a cyclical variable intended to allow for cyclical variation in productivity

Given the dating of  $k$ , capital formation in period  $t$  only affects output in period  $t + 1$ . Capital stocks were estimated on the assumption that depreciation occurs at a constant rate,  $\delta$ . Hence

$$k_t = (1-\delta)k_{t-1} + i_t$$

where  $i_t$  is gross capital formation occurring in year  $t$ .

Potential output is derived by assuming (1) full employment of labour (apart from frictional or structural unemployment), (2) full utilization of capital ( $c = 1$ ), (3) that the business cycle is in mid-phase ( $h =$  its average value), and (4) standard hours for workers. It is therefore a function of the actual net investment which has taken place in previous periods and the endogenously determined labour force.

The inverse of the production function, modified in the short run by a partial adjustment mechanism, determines the input of manhours into the production process in the solution of the model. When divided by hours worked per week employment is derived. Potential output and the notion of



standard hours are used to define standard productivity. The rate of change in money wages relative to the rate of change in standard productivity is a function of the ratio of actual to potential output, the rate of change in the prices of consumer goods and services, and the difference between the rate of change in the prices of consumer goods and services and the rate of change in the prices of products of the business non-agricultural sector (to capture the marginal revenue product effect). The long-run price in the business non-agricultural sector (a value-added price index) is determined by a weighted average of a markup on standard unit labour costs (that is, the wage rate divided by the reciprocal of standard productivity) and of the prices of internationally traded goods (imports and exports). Short-run price is determined by a partial adjustment towards long-run price.

The implicit price index of gross national product is determined as a weighted average of the endogenous price index for the business non-agricultural sector, exogenous prices for the agriculture and the personal sector, and wage rates in the government sector (which are assumed to move with wage rates in the business sector) and real indirect taxes less subsidies. Import prices are determined exogenously in foreign currencies as are export prices. Prices of consumption and capital goods are determined by a combination of import prices and the gross national product deflator. A proportionate adjustment is then made to the consumption and capital goods prices so that the expenditure components of gross national product equal the product of real gross national product times its implicit price index.

Personal disposable income is arrived at by subtracting from gross national product in nominal dollars capital consumption allowances, indirect taxes less subsidies, and national income not accruing to persons, and adding



transfer payments received by persons less direct taxes paid. It is converted to constant dollars by dividing by the implicit price index of personal expenditure on consumer goods and services. Real personal disposable income enters into the equations for personal expenditure on consumer goods and services and the equation for residential construction.

Labour income is derived as the product of wage rates and employment. Corporate profits are a function of the non-labour-income component of nominal dollar value added in the business sector. Other national income is the residual item after these two components are subtracted from national income.

Population is exogenous to the model<sup>3</sup>, as is immigration. Labour force participation is endogenous and equations in the model (similar to those in Appendix 3.3) generate national participation rates for eight different age-sex categories. Unemployment is obtained residually in the model as the difference between total labour force and total employment.

A small set of tax and transfer payment equations round out the government sector and enable government revenue and expenditure to be calculated. Hence, government saving and the government deficit or surplus (on a National Accounts) basis is derived.

The model has a simplified monetary sector. Interest rates respond to changes in the rate of real output (to reflect real demand factors), the difference between the actual and the expected rate of growth of the money supply, and the expected rate of inflation. The money supply can be taken to be exogenous although the model allows for two other possibilities: (i) the money supply changes in response to change in official international reserves in accordance with a predetermined money multiplier, or (ii) the

---

3 A population model is used to generate population projections when the model is used for projections into the future. See Cohen (1976).

money supply adjusts so that the income velocity of money is a constant. The last alternative was used for the present study.

The model was designed to be operated in a regime of flexible exchange rates<sup>4</sup>. To complete the balance of international payments, there are equations for direct investment in Canada, net security outflows, miscellaneous long-term capital flows, and two alternative equations for short-term capital flows - one for use if the exchange rate is flexible and one for when the rate is fixed. When the exchange rate is flexible, an iterative procedure is used to find the rate which equates the inflow of capital to the current account deficit or the outflow of capital to the current account surplus. A fixed exchange rate was used for the projection of Chapter Two while the flexible exchange rate mechanism was used in Chapter Seven to estimate the effect on the exchange rate of the alternative scenario.

A change in the exchange rate feeds through the model through its impact on the prices of imports and exports and on the prices of domestically produced goods and services and through its effect on some forms of capital flows where the supply is assumed to be denominated in U.S. dollars. In a fixed rate regime, the effect is on the change in official international reserves and, providing full sterilization does not occur, the money supply changes and, in response to this effect, there is a temporary change in interest rates and therefore there is a temporary effect on expenditure on durable consumer and producer goods.

The additions to the model to generate industrial output and employment are explained in Appendix 6.1.

---

4 See Carr, Jump, Sawyer (1976) for some experiments with TRACE Mk IIIR using both fixed and flexible exchange rates.

ONTARIO'S POPULATION AND LABOUR FORCE

by

David K. Foot

3.1 INTRODUCTION

The size of the population and hence of the labour force in Ontario is an important determinant of the output potential of the provincial economy. It also provides a guide to the number of 'jobs' that are required if that output potential is to be realised. Over time the growth of the population and hence of the labour force determines the potential growth path of the economy and indicates what new 'jobs' are required for the economy to operate at or near 'full employment'. One of the important considerations if such a goal is to be realised is the age and sex composition of the labour force. The correct matching of jobs to participants is important if full employment is to be achieved. This chapter is concerned with population and labour force growth and composition in Ontario - past, present and future. The trends of the past two decades are analysed and a methodology developed to obtain an internally consistent outlook for the demographic sector of the Ontario Economy over the next decade.

Such an exercise involves three main ingredients which are most

easily summarized by the simple identity<sup>1</sup>

$$\text{LABOUR FORCE} \equiv \text{PARTICIPATION RATE} \times \text{POPULATION}$$

This identity summarizes the relationship between the population and the labour force and indicates that to determine the size and growth of the labour force it is first necessary to determine the size and growth of the population and the proportion of the population that wishes to be employed.

This suggests a natural organisation of topics for this chapter. First, the growth of the population in the province is examined and a population projection model is developed and applied to Ontario data. Population projections by age and sex are developed based on certain assumptions regarding net migration and fertility. Second, the historical development of participation rates for selected age-sex categories are examined and participation rate equations are estimated for each of the age-sex categories. These are then used to obtain projections for the next decade. Third, the results of the two previous sections are combined to review the past labour force growth and composition in the province and to determine a consistent projection for the next decade. Fourth, the methodology and results of this study are briefly compared to those obtained by other researchers on this subject. Finally, the chapter concludes with a summary of the main findings of the study.

---

<sup>1</sup> This identity is modified later in the paper to accommodate many labour force groups and to take account of the differences in definition between total population and labour force source population (see section 3.4.2).



## 3.2 POPULATION

### 3.2.1 Population - Past

Since 1950 the population of Ontario has grown from 4.5 million persons to approximately 8.4 million persons (see Tables 3.1 and 3.6). This represents an annual average growth rate of 2.4 per cent. However, the growth of the provincial population has not been constant throughout the period, having declined from an annual average of 3.3 per cent over the earliest five-year period (1950-55) to an annual average of 1.6 per cent over the most recent five-year period (1972-77). The reasons for this decline in the rate of growth of the population in Ontario can be best described by examining the components of population growth.

The size of the provincial population at any point in time ( $t$ ) can be determined from the following stock-flow, recursive identity:

$$\begin{aligned}
 \text{POPULATION (t)} & \text{ equals } \text{POPULATION (t - 1)} \\
 & \text{ plus } \text{BIRTHS} \\
 & \text{ minus } \text{DEATHS} \\
 & \text{ plus } \text{INTERNATIONAL IMMIGRATION} \\
 & \text{ minus } \text{INTERNATIONAL EMIGRATION} \\
 & \text{ plus } \text{NET INTERPROVINCIAL MIGRATION}
 \end{aligned}$$

where all of the flows are measured between point  $t-1$  and point  $t$ . Consequently given the population size at some starting (or base) point (such as a Census year), the population at any subsequent point can be obtained by accumulating the sum of the net natural increase (BIRTHS minus DEATHS),



TABLE 3.1

ONTARIO VITAL STATISTICS, 1950-75

YEAR	POPULATION at June 1 (Thousands)	LIVE BIRTHS	DEATHS	IMMIGRATION
1950	4,471.0	108,708	43,948	39,041
1951	4,597.6	114,827	43,981	104,842
1952	4,788.0	123,891	44,402	86,059
1953	4,941.0	129,771	45,242	90,120
1954	5,115.0	136,261	44,515	83,029
1955	5,266.0	139,554	45,434	57,563
1956	5,404.9	143,516	47,231	92,849
1957	5,636.0	150,920	49,164	147,097
1958	5,821.0	152,637	48,677	63,853
1959	5,969.0	157,124	50,600	55,976
1960	6,111.0	159,245	51,484	54,491
1961	6,236.1	157,663	50,997	36,518
1962	6,351.0	156,053	52,156	37,210
1963	6,481.0	155,089	53,617	49,216
1964	6,631.0	152,729	52,204	61,468
1965	6,788.0	141,610	54,346	79,702
1966	6,960.9	131,942	54,171	107,621
1967	7,127.0	127,509	54,878	116,850
1968	7,262.0	126,257	55,552	96,155
1969	7,385.0	130,398	55,707	86,588
1970	7,551.0	134,724	56,769	80,732
1971	7,703.1	130,395	56,623	64,357
1972	7,833.9	125,060	58,905	63,805
1973	7,938.9	123,776	59,876	103,187
1974	8,093.9	124,229	60,556	120,115
1975	8,225.8	124,081e	59,895e	98,471

e - estimated.

SOURCES: Ontario Statistics 1975 and the Canadian Statistical Review.

net immigration (INTERNATIONAL IMMIGRATION minus EMIGRATION) and net inter-provincial migration.<sup>2</sup> Unfortunately, not all of these data can be accurately obtained over the intercensal period. Data on births, deaths and immigration are collected and published regularly, but data on emigration, and the interprovincial flows of persons are not collected and published on a regular basis. The published data are displayed in Table 3.1. These are collected on a calendar year basis, whereas the population figures (also presented in Table 3.1) refer to the stock of people on June 1 of each year.<sup>3</sup> To apply the above recursive identity to these data either the population stock must be converted to a year-end (December 31) basis or the components of population increase must be converted to a June 1 to May 31 or census year basis. Since the June 1 population stock measure is obtained from a Census every ten years, supplemented by a detailed intercensal survey five years after each census, it is useful to use this as the basis for the measurement of population. Consequently, the second alternative has been adopted in Table 3.2, where each of the published flow data have been crudely adjusted to a census year basis.<sup>4</sup> The corresponding five-year annual averages are presented in Table 3.3. It should be noted that the post-1971 data will be subject to revision with the publication of the 1976 census results.

---

2 Following Statistics Canada the word migration hereafter will be used to refer to interprovincial flows while the word immigration will be reserved for international flows.

3 June 1 is the Census date in Canada. Census years have been 1951, 1961 and 1971 over the period under consideration.

4 This was accomplished by linear splicing - namely 7/12 of the figure for year  $t-1$  was added to 5/12 of the figure for year  $t$ .

TABLE 3.2

## ESTIMATED COMPONENTS OF ONTARIO POPULATION GROWTH, 1951-75

(Thousands)						
YEAR	POPULATION at June 1	BIRTHS <sup>(1)</sup>	DEATHS <sup>(1)</sup>	RESIDUAL <sup>(2)</sup>	IMMIGRATION <sup>(1)</sup>	NET INTERPROV. MIGRATION minus EMIGRATION
1951	4597.6	112.3	44.0	58.3	66.5	- 8.2
1952	4788.0	118.6	44.2	116.0	97.0	19.0
1953	4941.0	126.3	44.8	71.5	87.8	-16.3
1954	5115.0	132.5	44.9	86.4	87.2	- 0.8
1955	5266.0	137.6	44.9	58.3	72.4	-14.1
1956	5404.9	141.2	46.2	43.9	72.3	-28.4
1957	5636.0	146.6	48.0	132.5	115.5	17.0
1958	5821.0	151.6	49.0	82.4	112.4	-30.0
1959	5969.0	154.5	49.5	43.0	60.6	-17.6
1960	6111.0	158.0	51.0	35.0	55.4	-20.4
1961	6236.1	158.6	51.3	17.8	47.0	-29.2
1962	6351.0	157.0	51.5	9.4	36.8	-27.4
1963	6481.0	155.7	52.8	27.1	42.2	-15.1
1964	6631.0	154.1	53.0	48.9	54.3	- 5.4
1965	6788.0	148.1	53.1	62.0	69.1	- 7.1
1966	6960.9	137.6	54.3	89.6	91.3	- 1.7
1967	7127.0	130.1	54.4	90.4	111.5	-21.1
1968	7262.0	127.0	55.2	63.2	108.2	-45.0
1969	7385.0	128.0	55.6	50.6	92.2	-41.6
1970	7551.0	132.2	56.2	90.0	84.1	5.9
1971	7703.1	132.9	56.7	75.9	73.9	2.0
1972	7833.9	128.2	57.6	60.2	64.1	- 3.9
1973	7938.9	124.5	59.3	39.8	80.2	-40.4
1974	8093.9	124.0	60.2	91.2	110.2	-19.0
1975	8225.8	124.2	60.3	68.0	111.1	-43.1

(1) Estimated: June 1 of year t-1 to May 31 of year t.

(2) Estimated Immigration plus Net Interprovincial Migration minus Emigration.

TABLE 3.3

ANNUAL AVERAGES OF ONTARIO POPULATION  
GROWTH COMPONENTS, 1950-75

(Thousands)

PERIOD	POPULATION GROWTH (per cent)	BIRTHS	DEATHS	RESIDUAL	IMMIGRATION	MIGRATION & EMIGRATION
1950-55	3.3	125.5	44.5	78.1	82.2	-4.1
1955-60	3.0	150.4	48.7	67.4	83.2	-15.9
1960-65	2.1	154.7	52.3	33.0	49.9	-16.8
1965-70	2.2	131.0	55.1	76.8	97.5	-20.7
1970-75	1.7	126.8	58.8	67.0	87.9	-20.9
1950-75	2.5	137.7	51.9	64.5	80.1	-15.7

SOURCE: Table 3.2

TABLE 3.4

BIRTH, FERTILITY AND DEATH RATES IN  
ONTARIO, SELECTED YEARS, 1950-75

YEAR	CRUDE BIRTH RATE	PERIOD TOTAL FERTILITY RATE	CRUDE DEATH RATE
1950	24.3	3.11	9.8
1955	26.5	3.76	8.6
1960	26.1	3.81	8.4
1965	20.9	3.14	8.0
1970	17.8	2.40	7.5
1975	15.1	1.85	7.3

SOURCES: Table 3.1 and Statistics Canada (91-514, 1974, 37).



From Table 3.3 it is apparent that annual population growth in the province averaged in excess of three per cent over the decade of the 1950s and in excess of two per cent over the decade of the 1960s. Over recent years, however, the growth rate has declined to well below two per cent. This pattern can be explained by reference to the components of population growth. From the table it is clearly apparent that the number of births in the province peaked over the decade from the mid-1950s to the mid-1960s when an annual average in excess of 150 thousand is recorded. This level is noticeably different from the first five years of the 1950s or the experience of the last decade when averages below 130 thousand are recorded. This pattern is reflected in the fertility rate of Ontario women (see Table 3.4) which rose from an average number of births per woman of 3.11 in 1950 to peak at 3.81 in 1960 and thereafter decline quite dramatically to a 1975 level of 1.85. Since the replacement level for the population is estimated to be around 2.1, this indicates that under stable population conditions the Ontario population would no longer maintain itself from natural increase alone.

The annual number of deaths in the province has been rising steadily over the period 1950 to 1975 from around 44 thousand persons at the beginning of the period to around 60 thousand persons by the end of the period. This reflects the increasing size of the population, although the number of deaths per 1,000 of population (the crude death rate in Table 3.4) has been declining throughout the period.

The difference between births and deaths is defined as the net natural increase of the population, while the difference between the actual



population growth and the net natural increase over the same period must be accounted for by net immigration and net migration. The magnitude of this 'residual' is outlined in Tables 3.2 and 3.3 where it can be deduced that over the past twenty-five years in Ontario it has averaged approximately three-quarters of the natural increase in absolute numbers. Consequently, the net inflow of persons from overseas and from other parts of Canada has made a substantial contribution to Ontario's population growth over the period under consideration.

From Tables 3.2 and 3.3 it is apparent that this has been the most volatile component of population change. Over the decade of the 1950s the annual average increase from this source averaged in excess of 70 thousand persons.<sup>5</sup> However over the first five years of the 1960s, growth from this source was substantially reduced to average 33 thousand persons. Over the decade 1965-75, levels comparable to the decade of the 1950s have been recorded, although over the period 1970-75 the average has been only slightly higher than the average for the entire twenty-five year period.

Because of the lack of published data on all of the four components that make up this residual category (international and interprovincial inflows and outflows), it is not possible to accurately pinpoint the exact source of the volatility. However data on international inflows by pro-

---

5 Taking a somewhat longer perspective Dallimore and Lampert (1973) provide the following decadal annual averages since 1901: 1901-11, 13.2 thousand; 1911-21, 11.0 thousand; 1921-31, 15.4 thousand; 1931-41, 7.8 thousand; and 1941-51, 30.5 thousand. Consequently, the 1950s represented a significant increase from this source.

vince of intended destination are available and these have been included in Tables 3.2 and 3.3 and removed from the 'residual' category in an attempt to ascertain whether this is the main cause of the volatility. This series is subject to wide variations and basically mirrors, at least on a medium-term basis (Table 3.3), the movements in the total 'residual' category. This is confirmed by the relative constancy of the last column in Table 3.3, at least over the past two decades, and suggests that, on average, between 15 and 20 thousand persons are lost to emigration and net interprovincial migration. A slight upward trend is discernable. However on a year-over-year basis (Table 3.2) there is still considerable volatility in the series and figures from the last three years suggest that the most recent experience is for considerably higher losses from this source, although this is not without historical precedent (see 1967-69). If the level of international emigration is the relatively more stable of the two components, then the recent experience would suggest that there has been a change in the interprovincial migration patterns away from Ontario.

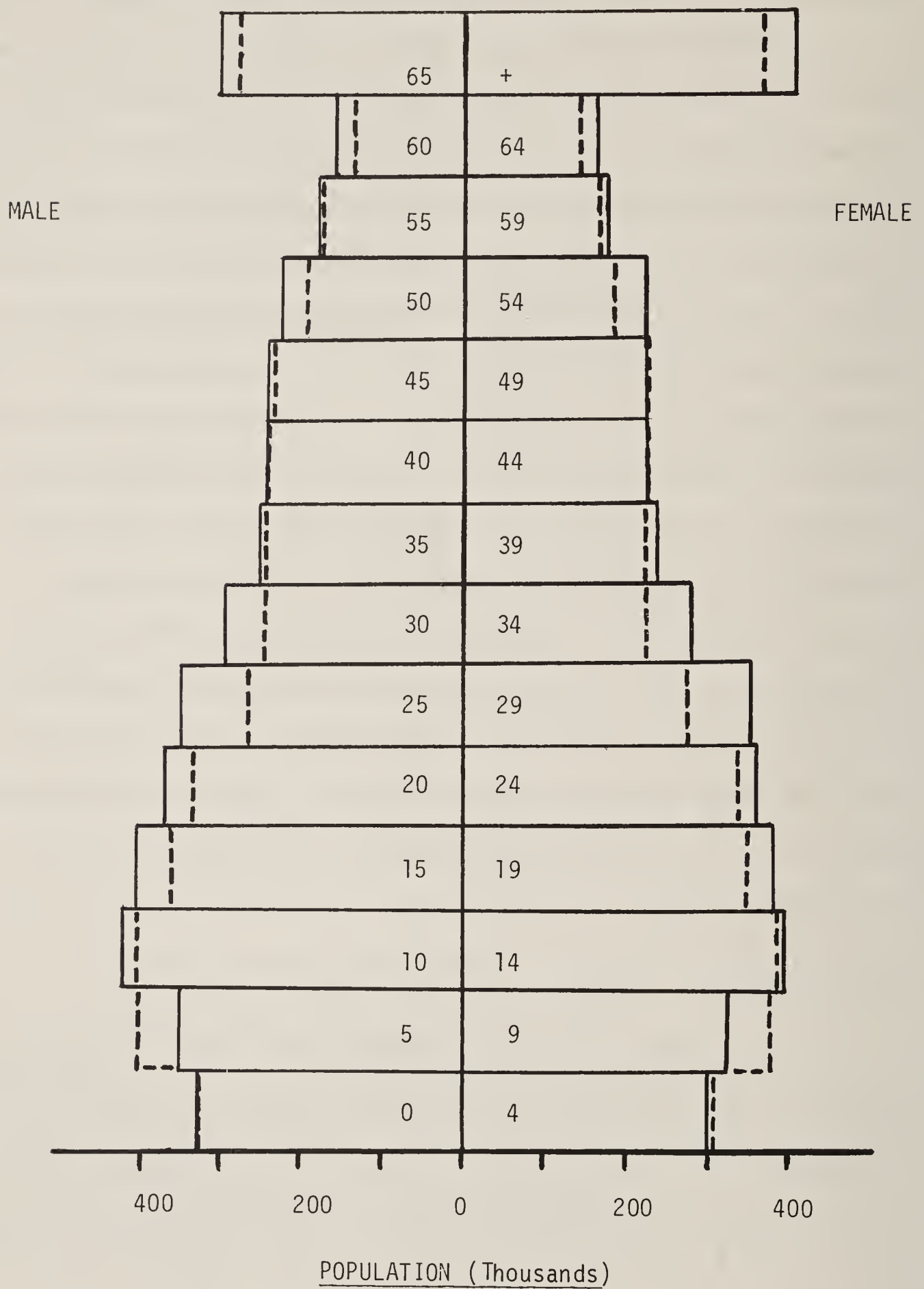
By examining Table 3.3 it is possible to summarize the determinants of Ontario population growth over the period 1950 to 1975. Over the 1950-55 period the relatively high growth of the population can be attributed to a moderately high birth rate and a substantial net inflow from outside Ontario's borders. Although the level of immigration was high, the net loss from emigration and net interprovincial migration was the lowest (in absolute numbers) of any of the five year periods. Over the 1955-60 period birth rates were at high levels, the death rate was declining, the

immigration level did not change, but the net losses from emigration and net interprovincial migration increased, thus reducing the growth in population. The 1960-65 period saw a decline in the birth rate although the average number of births was slightly higher than in the previous period, but much more dramatic was the decline in international immigration over the period. This reduced the provincial population growth substantially. Over the period 1965-70 even though international immigration returned to historically high levels, the birth rate and number of births declined substantially so that the growth in population was almost unchanged from that of the previous five years. The most recent period (1970-75) has witnessed a continuation of the decline in birth rates and numbers of births, an increasing number of deaths and a lowering in the average level of immigration. The net effect has been a further decline in the population growth rate. In conclusion, it should be noted that the experience of the years 1972-75 is notably different from that of 1970-71 and this is an important consideration in the assessment of future trends; but first the present structure of the Ontario population is examined in the following section.

### 3.2.2 Population - Present

The most recent (1975) age-sex composition of the Ontario population estimated by Statistics Canada is displayed in Chart 3.1. Also displayed (with dotted lines) is the composition for the most recent (1971) Census. From this figure it is apparent that the numerically largest five year age groups are the teenagers and this reflects the high number of births between

## CHART 3.1

AGE-SEX COMPOSITION OF ONTARIO POPULATION, 1971 AND 1975

KEY: 1971 ---- 1975 ———

SOURCE: Statistics Canada (92-716, 1973) and unpublished calculations.



the mid-1950s and the mid-1960s. The comparatively reduced size of the zero to 9 year age groups reflect the declining birth rates over the past decade, while the increasing size of the 65 and over age groups reflects the increasing aging of the Ontario population. These characteristics are similar to those observed at the national level (see Foot (1975a)). This composition of the present Ontario population has important implications for the levels of births and deaths that can be expected over future years and for the future growth of the Ontario labour force, not to mention the future demands on educational facilities, etc. It is on the determination of the future trends in population that the following section is devoted.

### 3.2.3 Population - Future

To project the growth and composition of the population of Ontario over the next fifteen years it is necessary to construct a population projection model based on the stock-flow, recursive identity outlined above. In particular the size of the population in any age group  $j$  at time  $t$  (denoted  $POP_{jt}$ ) can be determined as follows:<sup>6</sup>

$$POP_{jt} \equiv POP_{jt-1} + ADDITIONS_{jt} - SUBTRACTIONS_{jt}$$

while the total population of the province at time  $t$  is simply the sum

$$POP_t \equiv \sum_j POP_{jt}$$

---

6 The reader is reminded that the flow variables ( $ADDITIONS_{jt}$  and  $SUBTRACTIONS_{jt}$ ) are measured between point  $t-1$  and point  $t$ .  $ADDITIONS_{jt}$  includes all persons entering group  $j$  as a result of the aging of the population, new residents to the province and, where relevant, births over the period.  $SUBTRACTIONS_{jt}$  includes all persons leaving group  $j$  as a result of the aging of the population, residents departing from the province and deaths over the period.



To implement this approach it is necessary to have an initial ( $t=0$ ) or starting population composition and to determine births, deaths and the residual. Each of these inputs for the population projection model, which is described in Appendix 3.1, is now considered:

- (i) Starting Population - Either of the population compositions displayed in Figure 3.1 could be used as the starting population. For this paper the 1971 composition was used to validate the model (see Appendix 3.1) while the 1975 composition was used as a basis for the projections.
- (ii) Births - The total number of births depends on the total number of women in their childbearing years multiplied by the average number of children expected to be born to a woman over her childbearing lifetime. The former can be determined within the model, while the latter is determined by a multiple of complex socio-economic factors outside the model. The historical trends in the period total fertility rate have already been examined and for the purpose of this projection it was assumed that no further declines take place. Consequently, a period total fertility rate of 1.85 was assumed for the projection period.
- (iii) Deaths - The total number of deaths can be determined endogenously within the model by multiplying the number of people in each age category by the probability of death for that particular age category. These probabilities can be obtained from projected life

tables and, for this paper, the Canadian life tables employed by Statistics Canada are used as there is little difference between the Ontario and Canadian experiences.

- (iv) The Residual - This is the most difficult and, for the purposes of this chapter, the most important of the assumptions to be made. First the level of net immigration plus net migration must be determined, then this level must be distributed over the various age-sex groups in the model. The average annual level of the residual over the past twenty-five years was 64.5 thousand persons made up of international immigration of 80.1 thousands and a net outflow of 15.7 thousand persons due to emigration and net provincial migration (Table 3.3). Over the comparable period international immigration to Canada average 152.7 thousand persons - consequently, Ontario captured 53.4 per cent of the Canadian total over this period. As shown in Table 3.5, there has been an increasing trend in this percentage. Whether Ontario can continue to maintain this percentage is a matter for considerable debate. With the implementation of any national policy of decentralisation and with the likely increased prosperity of the Prairie provinces over the next decade this prospect seems somewhat unlikely. Consequently, for the purpose of this paper, it is assumed that Ontario will capture 50 per cent of a projected national immigration averaging 150 thousand persons, or 75 thousand persons, per year over the projection horizon. In addition, the upward movement in the average net loss to emigration and net interprovincial migration is assumed

to continue and a figure of 25 thousand persons is assumed. As a consequence, for the purpose of this paper, the residual is assumed to amount to a net intake of 50,000 persons per year over the projection horizon.<sup>7</sup> This figure is then distributed over the various age-sex categories in the proportions estimated by the Ontario government.<sup>8</sup>

TABLE 3.5

IMMIGRATION TO ONTARIO AS A PERCENTAGE  
OF IMMIGRATION TO CANADA,  
1925-75

Period	Percentage
1925-30	31.4
1930-35	44.3
1935-40	40.0
1940-45	41.4
1945-50	49.8
1950-55	53.2
1955-60	52.9
1960-65	53.0
1965-70	53.6
1970-75	53.9
1950-75	53.4

SOURCE: Canadian Statistical Review, various issues.

- 
- 7 Naturally other combinations of assumptions can lead to the same figure - for example, 55 per cent of 130,000 gross immigration minus 21,500 net loss. In their analysis Dallimore and Lampert (1973) used 30,000 and 60,000 persons per year. The effects of alternative assumptions on population size are examined in Appendix 3.2.
- 8 The author wishes to express his thanks to Mr. R. Kogler of the Ontario Ministry of Treasury, Economics and Intergovernmental Affairs for making this information available.

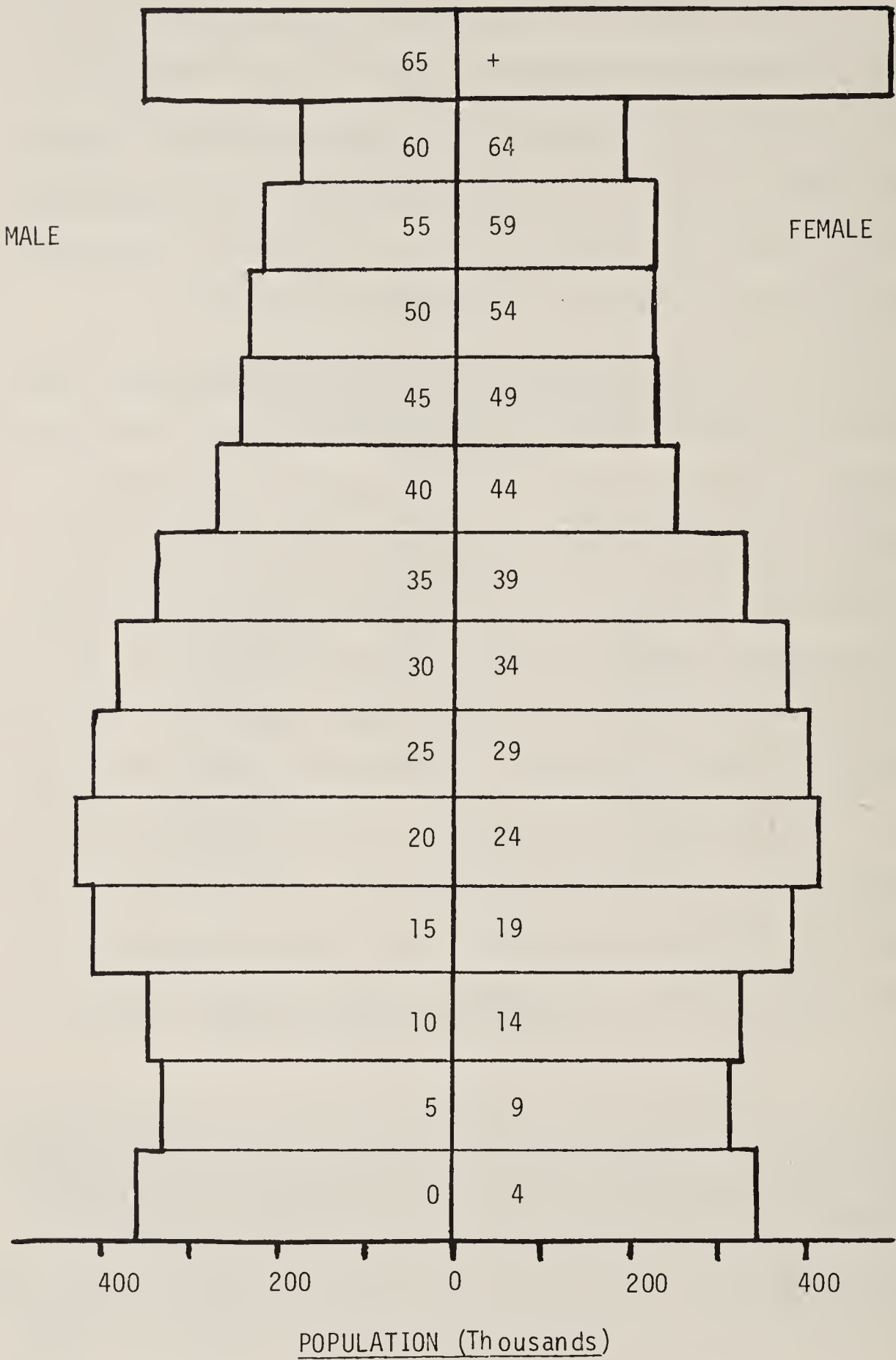
One of the advantages of constructing a population projection model is that it is possible to test the sensitivity of the results to the assumptions. The model was constructed using the same structure as set out in Cohen (1976) which in turn follows the methodology outlined by Statistics Canada (91-516, 1975). Consequently, the sensitivity of the results to the assumptions, particularly to the fertility rate and the residential inflow assumptions, can be easily undertaken.<sup>9</sup>

The results obtained from the Ontario population projection model for the next fifteen years assuming a fertility rate of 1.85 births per woman and a residual net inflow of 50,000 persons are presented in Table 3.6. They show an Ontario population rising from 8.226 million persons in 1975 to reach a level of 9.725 million persons by 1987, 50.6 per cent of which are females compared to the present proportion of 50.2 per cent. The age-sex composition of this population growth pattern in 1982 and 1987 is presented in Charts 3.2 and 3.3. They show an increasingly aging population. This is especially apparent by examining the percentage of the population 65 years and over, which rises from a 1975 level of 8.6 per cent to a 1987 level of 10.0 per cent (Chart 3.4). On the other hand the percentage of the population of school age (5 to 19 years) falls from a

---

9 Appendix 3.2 is devoted to an analysis of the size of the population under alternative assumptions for the residual. Since the ultimate purpose of this paper is to draw implications for labour force growth through 1987 and those born in 1976 will not enter the labour force until 1990, sensitivity with respect to the fertility assumption is not presented. It should be noted, however, that the fertility assumption will affect the labour force via female participation rates (see section 3.3.1).

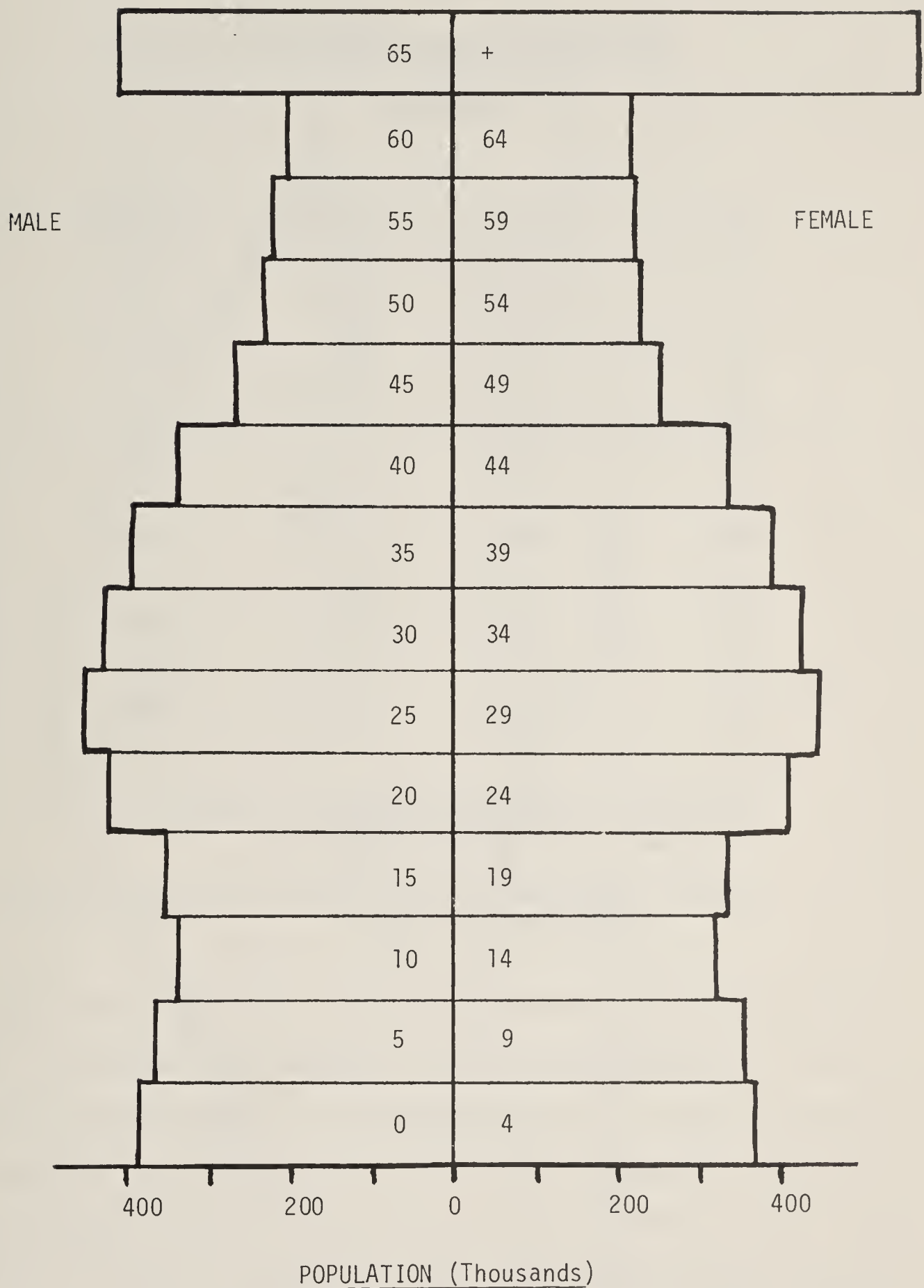
CHART 3.2  
PROJECTED AGE-SEX COMPOSITION OF ONTARIO  
POPULATION, 1982



SOURCE: Projections by the Institute for Policy Analysis,  
University of Toronto.



CHART 3.3  
PROJECTED AGE-SEX COMPOSITION OF ONTARIO  
POPULATION, 1987



SOURCE: Projections by the Institute for Policy Analysis,  
 University of Toronto.

TABLE 3.6

PROJECTED POPULATION FOR ONTARIO\*, 1975-87

(Thousands)

Year	Total	Total Males	Total Females
1975	8225.8	4095.4	4130.4
1976	8342.3	4150.7	4191.6
1977	8460.9	4207.1	4253.8
1978	8581.8	4264.5	4317.3
1979	8704.5	4322.8	4381.7
1980	8829.0	4382.0	4447.0
1981	8956.7	4442.2	4514.5
1982	9085.5	4502.9	4582.6
1983	9214.8	4563.8	4651.0
1984	9343.8	4624.6	4719.2
1985	9471.6	4684.8	4786.8
1986	9599.4	4744.2	4855.2
1987	9724.9	4802.5	4922.4

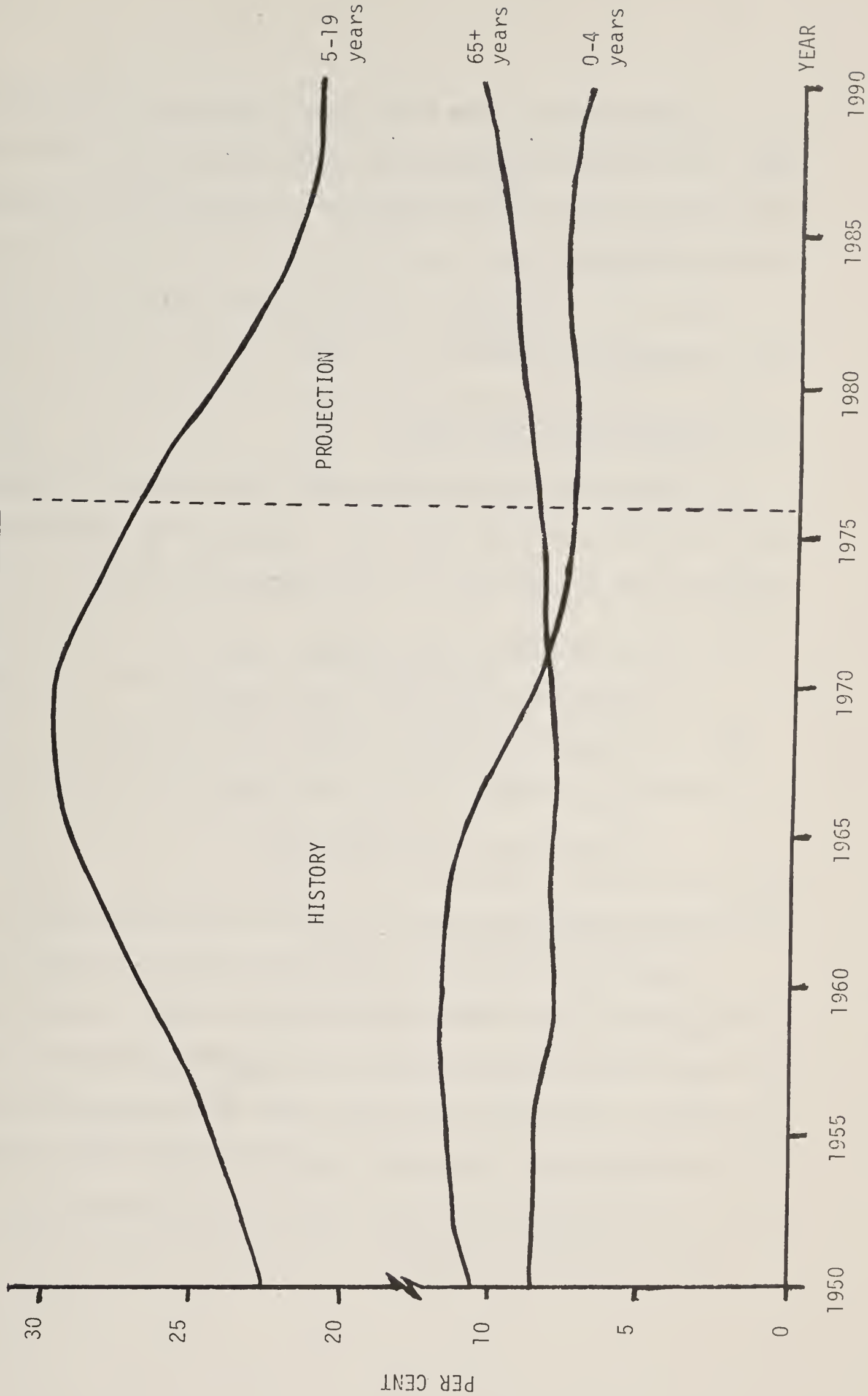
\*Assuming a period total fertility = 1.85 and a  
'residual' = 50,000 persons per year.

SOURCE: Projections by the Institute for Policy Analysis,  
University of Toronto.

1975 level of 27.8 per cent to a 1987 level of 21.4 per cent. These proportions are presented for the entire 1950-90 period in Chart 3.4. Also presented in Chart 3.4 is the proportion of very young people (0 to 4 years) which shows an increase in the first part of the 1980s as the present teenagers reach the traditional childbearing years. Overall population growth in this projection continues to slow - to an annual average of 1.4 per cent

CHART 3.4

HISTORICAL AND PROJECTED ONTARIO POPULATION COMPOSITION,  
SELECTED AGE GROUPS, 1950-90



SOURCE : Ontario Statistics 1975, and Projections by the Institute for  
Policy Analysis, University of Toronto.

over the decade 1977 to 1987, with a gradual decline to 1.3 per cent in 1987. This slowing in the growth of total population will be reflected in the labour force, but first the trends in labour force participation must be examined.

### 3.3 PARTICIPATION RATES

#### 3.3.1 Participation Rates - Past

Disaggregated data on Ontario labour force participation are available from Statistics Canada since 1956. A total of ten categories are available, five for each sex.<sup>10</sup> They are defined as follows:

- 14 to 19 years (called young, group 1)
- 20 to 24 years (called young, group 2)
- 25 to 44 years (called prime, group 1)
- 45 to 64 years (called prime, group 2)
- 65 years and over (called old).

These data are presented in Table 3.7 covering the period 1956-75.

The highest participation rates over the period have been recorded by the three male groups aged between 20 and 64 years. In each case the rate has exceeded 90 per cent but the trend has been downward since the early 1960s. Nevertheless the rates in these three groups, and especially the 25 to 44 year age group, has remained much higher than all

---

<sup>10</sup> Data for ten-year age groups are only available back to 1966.

other groups. The very young age groups (14 to 19 years) have both displayed a U-shaped pattern with a trough in the mid-1960s. Since the main alternative for these people is staying in school, this pattern suggests that a relatively greater proportion of this group has been choosing the labour force over schooling in recent years. The trend in the participation rates for each of the three female categories and between 20 and 64 years has been noticeably upward, especially over the past decade. This is exactly opposite to the trends in the comparable male categories. For the older people the trend has also been downward, particularly since the mid-1960s.

The interesting exercise is to try and determine why these trends have occurred and, in particular, to test certain hypotheses about the determinants of medium-term trends in labour force participation in Ontario. The remainder of this section is devoted to reporting on the results of this econometric research. The data sources and estimated equations are presented in Appendix 3.3.

Much of the work on labour force participation has been short-term in nature and concentrated on testing the encouraged and discouraged worker hypotheses (e.g., Officer and Andersen (1969), Proulx (1969), Swidinsky (1970)). More recent work (Illing (1973), Grubel, Maki and Sax (1975), Green and Cousineau (1976), Jump and Rea (1975)) has suggested other determinants of labour force participation, particularly with respect to the underlying medium-term trends. These include the effects of income maintenance programs, urbanisation and fertility.



TABLE 3.7  
ONTARIO PARTICIPATION RATES, SELECTED AGE-SEX GROUPS, 1956-75  
(Per Cent)

YEAR	AGE GROUPS				
	15 - 19	20 - 24	25 - 44	45 - 64	65+
MALES					
1956	49.8	93.4	98.8	94.1	39.0
1957	47.3	93.1	98.9	94.0	39.2
1958	45.0	92.7	99.0	94.6	36.0
1959	43.9	92.2	98.9	94.0	34.9
1960	42.6	92.2	98.9	94.8	33.9
1961	39.1	91.2	98.7	94.2	32.4
1962	38.9	89.0	98.7	93.8	32.3
1963	41.2	90.3	98.9	94.1	29.4
1964	39.5	89.2	98.7	94.0	31.0
1965	38.6	88.0	98.6	94.0	30.6
1966	38.6	87.7	98.4	94.0	29.8
1967	39.6	86.3	98.0	93.6	27.8
1968	40.0	85.1	97.8	93.6	26.9
1969	37.9	84.7	97.9	93.2	26.9
1970	39.4	83.2	97.6	92.9	25.2
1971	38.8	83.1	97.5	91.9	22.0
1972	41.4	85.2	97.4	91.8	20.8
1973	44.1	84.4	97.3	91.2	19.8
1974	46.2	85.2	97.4	90.5	18.8
1975	46.7	84.7	97.1	89.6	19.4

TABLE 3.7 (CONT.)

ONTARIO PARTICIPATION RATES, SELECTED AGE-SEX GROUPS, 1956-75

(Per Cent)

AGE GROUPS

YEAR	15 - 19	20 - 24	25 - 44	45 - 64	65+
FEMALES					
1956	39.3	51.9	30.5	26.0	6.4
1957	38.4	49.2	31.4	28.6	6.7
1958	32.6	50.3	30.4	28.2	6.9
1959	34.6	47.4	31.3	29.0	6.7
1960	35.6	48.2	33.6	31.3	7.4
1961	32.8	50.3	33.8	33.8	6.9
1962	31.7	50.5	34.2	34.1	6.7
1963	31.4	50.8	34.9	35.4	7.3
1964	31.6	53.4	36.8	36.9	7.9
1965	30.8	53.0	37.2	37.6	6.3
1966	31.2	56.3	39.0	38.0	6.1
1967	31.5	58.1	40.2	39.4	5.6
1968	31.8	59.2	40.9	39.5	6.5
1969	31.1	60.1	43.4	39.5	5.3
1970	31.4	59.8	43.5	40.8	5.2
1971	34.0	61.0	45.2	40.8	5.7
1972	34.2	62.9	47.7	40.4	4.9
1973	36.0	63.4	49.0	42.7	4.2
1974	39.5	66.4	51.0	42.6	3.8
1975	39.6	67.7	54.3	41.8	4.7

SOURCE: Statistics Canada, unpublished calculations.

All of these determinants play a role in determining labour force participation in Ontario. As expected, schooling is an important determinant of labour force participation by the youngest age group, both male and female. Similarly, attendance at university dominates for males 20-24. Participation by females in that age group, however is influenced by the level of fertility. It is interesting to note that labour market conditions affect mainly the youngest workers, that is, those for whom social pressure and financial reasons are not the prime factors affecting participation. The positive coefficient on the employment variable indicates the predominance of the discouraged worker effect for these groups. The presence of a lagged dependent variable in the equations for prime and older males confirms the stability of participation by primary workers with the coefficient suggesting a much slower response for the older (45 to 64 years) group. The inclusion of urbanisation in the equations for both prime-age groups of women and older women is important. It suggests that changing attitudes, that is, increasing acceptance of career women, has contributed to higher female participation in the labour force. Of the two income maintenance variables, old age security has a significant negative impact on participation. Interestingly, the availability of unemployment insurance does not seem to have had a significant influence on participation rates in Ontario. Finally, a trade-off influence was tested and found to be significant in the prime male groups, as seen by the inclusion of the corresponding female participation rate variable in

these equations. This result implies that decreasing labour force participation by males has been influenced by increasing female labour force participation. It is interesting to note that the reverse does not appear to be true. The reader is referred to Appendix 3.3 for a greater elaboration of these results.

### 3.3.2 Participation Rates - Present

In 1975 Statistics Canada introduced a revised labour force survey to obtain its information on labour market conditions. A number of substantial changes were introduced both conceptually and in the data obtained.<sup>11</sup> Fortunately the old and revised surveys were maintained concurrently throughout 1975 so that the effects of these changes could be estimated. Table 3.8 outlines the effects on labour force participation in Ontario for each of the ten age-sex groups. Generally the effect was to raise the measure of labour force participation for all female groups and the young and old male groups and to lower it slightly for the three high rate male groups aged between 20 and 64 years. The most dramatic effects (increases) were in the very young (15 to 19 years) age groups.

All future measurements of labour market conditions by Statistics Canada will be conducted with the revised survey so the revised figures in Table 3.8 provide the new basis on which any future projections must be constructed.

---

11 See the Canadian Statistical Review, March 1976 for a brief discussion of these changes.

TABLE 3.8

PARTICIPATION RATES IN ONTARIO UNDER  
THE OLD AND REVISED LABOUR FORCE  
SURVEYS, 1975

(Per Cent)

GROUP	OLD LFS	REVISED LFS	DIFFERENCE
MALES			
15 - 19*	46.7	57.1	+10.4
20 - 24	84.7	84.2	-0.5
25 - 44	97.1	96.6	-0.5
45 - 64	89.6	89.5	-0.1
65 +	19.4	20.3	+0.9
FEMALES			
15 - 19*	39.6	51.7	+12.1
20 - 24	67.7	68.9	+1.2
25 - 44	54.3	58.8	+4.5
45 - 64	41.8	44.5	+2.7
65 +	4.7	5.2	+0.5

\* In the Old LFS this group was defined 14-19 years.

SOURCE: Statistics Canada, unpublished calculations and The Labour Force (June 1976,56), Catalogue No. 71-001.



### 3.3.3 Participation Rates - Future

The participation rate equations discussed in section 3.3.1 above, together with the level adjustments outlined in section 3.3.2 above, can be used to develop detailed participation rate projections for the next decade. These are presented in Table 3.9.

For the next decade these projections show increasing participation rates for the younger (15 to 24 years) age groups, declining participation rates for prime age (25 to 64 years) males, increasing participation rates for prime age females and relatively unchanged participation rates for the old (65 years and over) age groups. This suggests that younger people and prime age females will become relatively more important components of the labour force over the next decade. However, the actual numbers in these age groups in the labour force will also depend on the age structure of the population. The following section is concerned with the combination of these two determinants of the labour force.

## 3.4 LABOUR FORCE

### 3.4.1 Labour Force - Past

The growth of the labour force in Ontario since 1950 is indicated in Tables 3.10 and 3.14. Since 1950, the labour force in Ontario has more than doubled, rising from 1.8 million persons in 1950 to over 4.0 million persons by 1977. This represents an average annual growth rate of 3 per

TABLE 3.9

PROJECTED ONTARIO PARTICIPATION RATES,  
SELECTED AGE-SEX GROUPS, 1976-87

		1976	1977	1978	1979	1980	1981
PARTICIPATION RATES BY SEX AND AGE (PER CENT)							
MALES BY AGE GROUPS							
15 TO 19		57.207	57.471	57.568	58.007	58.745	59.482
20 TO 24		84.234	84.704	85.055	85.251	85.488	85.834
25 TO 44		96.095	95.798	95.604	95.525	95.462	95.399
45 TO 64		89.383	89.083	88.794	88.503	88.209	87.900
65 & OVER		20.947	20.991	21.091	21.119	21.032	20.942
FEMALES BY AGE GROUPS							
15 TO 19		52.691	52.563	52.723	53.352	54.055	54.720
20 TO 24		69.032	69.240	69.239	69.711	70.304	70.911
25 TO 44		58.788	59.670	60.320	59.672	60.105	60.748
45 TO 64		44.776	44.890	44.842	45.025	45.270	45.713
65 & OVER		5.013	4.804	4.847	4.828	4.767	4.744
MALES BY AGE GROUPS							
15 TO 19		60.533	61.356	62.235	62.764	62.880	63.368
20 TO 24		86.360	86.749	87.251	87.632	87.832	88.644
25 TO 44		95.320	95.243	95.159	95.081	94.995	94.878
45 TO 64		87.569	87.223	86.858	86.487	86.123	85.755
65 & OVER		20.865	20.865	20.860	20.871	20.854	20.784
FEMALES BY AGE GROUPS							
15 TO 19		55.549	56.436	57.250	57.901	58.364	58.649
20 TO 24		71.735	72.407	73.169	73.629	73.761	74.150
25 TO 44		61.737	62.464	63.407	64.117	65.056	66.627
45 TO 64		46.320	46.813	47.371	47.693	47.763	48.026
65 & OVER		4.731	4.759	4.756	4.764	4.750	4.715

SOURCE: Projections by the Institute for Policy Analysis, University of Toronto

TABLE 3.10

LABOUR FORCE GROWTH IN ONTARIO, 1951-75

YEAR	LABOUR FORCE (Thousands)	ANNUAL GROWTH RATE (Per Cent)	AVERAGE ANNUAL GROWTH RATE
1951	1,870	2.4	2.4
1952	1,908	2.0	
1953	1,948	2.1	
1954	2,022	3.8	
1955	2,059	1.8	
1956	2,147	4.3	2.9
1957	2,238	4.2	
1958	2,264	1.2	
1959	2,301	1.6	
1960	2,377	3.3	
1961	2,401	1.0	1.9
1962	2,422	0.9	
1963	2,476	2.2	
1964	2,556	3.2	
1965	2,614	2.3	
1966	2,719	4.0	3.7
1967	2,834	4.2	
1968	2,934	3.5	
1969	3,032	3.3	
1970	3,130	3.2	
1971	3,249	3.8	4.0
1972	3,381	4.1	
1973	3,509	3.8	
1974	3,671	4.6	
1975	3,810	3.8	

SOURCE: Statistics Canada, The Labour Force, Catalogue No. 71-001.

cent, but this average is increased by the experience of the past decade when the average annual growth rate approached 4 per cent. A comparison of the last column in Table 3.10 with Table 3.3 suggests that labour force growth in the province has been closely tied to the rate of immigration, although the increase in female participation rates since the mid-1960s has undoubtedly contributed to the higher growth rates of the past decade.

Decomposing the determinants of the growth in the labour force into additive components is not an easy task. Although in the first instance it can be attributed to only two components, namely participation rates and population, the latter (as has already been demonstrated) depends on six main components (the inflows and outflows associated with net natural increase, net immigration and net migration) of which immigration is only one component. The application of 'standardisation' analysis with an additive decomposition has been demonstrated by Denton, Feaver and Robb (1975), but the extension to a greater number of components - the case in point - has yet to be outlined. However, one of the demonstrations of this paper has been that the most volatile components are immigration and certain participation rates and hence the volatility in past labour force growth can reasonably be attributed primarily to these components.

#### 3.4.2 Labour Force - Present

To determine the size of the Ontario labour force it is necessary

to employ the basic identity:

$$\text{LABOUR FORCE} = \text{PARTICIPATION RATE} \times \text{POPULATION}$$

However this simple identity must now be modified to reflect the fact that the participation rates and the population have been disaggregated into a number of age-sex groups. The population model can determine population by single year age groups for each sex, but the greatest disaggregation available in the participation rates (that is appropriate for this study) divides the population into ten age-sex groups. Consequently the above identity must be rewritten as:

$$LF = \sum_{j=1}^{10} LF_j = \sum_{j=1}^{10} PR_j \times LPOP_j$$

where LF = labour force

PR = participation rate

LPOP = labour force source population

This in turn raises a further complication since all labour force information refers to the civilian, noninstitutionalised labour force and hence must be derived from an appropriate source population. This means that an adjustment factor (denoted  $\alpha_j$ ) must be calculated for each group to remove the relevant persons<sup>12</sup> from the population before applying the above

---

<sup>12</sup> These persons include military personnel, persons in prisons and other institutions and Indians on reserves.



identity: that is

$$LPOP_j = \alpha_j \times POP_j \qquad 0 < \alpha_j < 1$$

where POP = total population. The calculation of  $\alpha_j$  for each age-sex group is outlined in Table 3.11 using data for 1975 from the revised labour force survey. In projecting the labour force in the following section it is assumed that these  $\alpha_j$  remain unchanged throughout the projection period.

### 3.4.3 Labour Force - Future

Table 3.12 presents estimates of labour force source population for each of the ten age-sex groups, which are consistent with the population projections outlined in Section 3.2.3 above. To obtain labour force projections each of these source populations must be multiplied by the projected participation rates presented in Table 3.9. The results are presented in Tables 3.13 and 3.14. The bottom half of Table 3.13 shows the relative importance (in per cent) of each of the ten groups as far as contribution to labour force is concerned.

The results indicate an increase of around 5 per cent in the proportion of females in the labour force over the next decade and a consequent decrease in the proportion of males. The increase is particularly apparent for females aged 25 to 44 years, while the decrease for males occurs in the 45 to 64 year age group. It is interesting to note that the proportion of young people in the labour force (aged 15 to 24 years) is

TABLE 3.11

CALCULATION OF LABOUR FORCE SOURCE  
POPULATION ADJUSTMENT FACTORS ( $\alpha_j$ ),  
1975

GROUP	TOTAL POPULATION ( '000)	LABOUR FORCE SOURCE POPULATION ( '000)	ADJUSTMENT FACTORS
MALES			
15 - 19	403.6	397	0.98365
20 - 24	368.7	362	0.98183
25 - 44	1,144.2	1,125	0.98322
45 - 64	790.1	782	0.98975
65 +	296.7	286	0.96394
FEMALES			
15 - 19	387.4	383	0.98864
20 - 24	366.7	364	0.99264
25 - 44	1,113.8	1,110	0.99659
45 - 64	811.4	807	0.99458
65 +	412.6	392	0.95007

SOURCES: Statistics Canada, unpublished calculations.

TABLE 3.12

ONTARIO LABOUR FORCE SOURCE POPULATION  
 PROJECTIONS, SELECTED AGE-SEX GROUPS,  
 1975-87  
 (Thousands)

YEAR	AGE GROUPS				
	15 - 19	20 - 24	25 - 44	45 - 64	65+
MALES					
1975	397.0	362.1	1125.1	782.0	286.0
1976	405.5	372.8	1154.1	796.0	294.3
1977	411.1	384.1	1184.6	808.4	303.0
1978	417.0	394.7	1217.5	820.1	311.9
1979	420.1	404.1	1254.4	828.9	321.3
1980	420.1	411.0	1295.0	837.3	330.6
1981	411.9	419.4	1334.6	848.4	337.7
1982	400.9	424.9	1376.5	859.1	344.0
1983	383.2	430.8	1418.7	871.7	349.1
1984	367.1	433.8	1461.3	883.6	355.0
1985	354.9	433.8	1503.4	893.1	364.3
1986	349.0	425.7	1546.1	902.3	374.4.
1987	347.3	414.8	1582.0	915.1	385.7
FEMALES					
1975	383.1	363.9	1110.1	807.0	391.9
1976	389.9	374.3	1142.8	821.5	402.3
1977	395.2	384.2	1177.0	834.5	413.5
1978	400.1	392.9	1212.9	847.0	425.1
1979	403.5	400.2	1252.6	856.6	437.6
1980	403.5	405.6	1294.7	865.7	450.6
1981	396.4	412.4	1336.9	877.3	462.5
1982	384.7	417.7	1380.7	888.5	473.6
1983	368.7	422.6	1424.1	901.1	484.0
1984	352.8	426.1	1466.5	913.9	495.4
1985	341.8	426.1	1509.7	922.3	510.5
1986	335.8	418.9	1552.9	931.6	527.8
1987	333.7	407.2	1592.6	941.0	547.1

SOURCE: Projections by the Institute for Policy Analysis, University of Toronto.

projected to decline over the next decade.

In Table 3.14, the resulting total Ontario labour force projections show a labour force increasing from its 1977 level of just over 4 million persons to reach about 5 million persons by 1987, or a gain of approximately a million persons. This increase is divided almost equally between males and females thus resulting in an increase of two percentage points in the female proportion of the labour force (see Table 3.13). The implied annual labour force growth averages 2.3 per cent over the period 1978-82 and 1.9 per cent over the period 1983-87. These are considerably less than the growth rates recorded over the past decade (see Table 3.10) and more closely resemble the aggregate average annual growth rates recorded in the first half of the 1950s and the first half of the 1960s respectively. It is important to note that the labour force growth rates are all below 2 per cent for the last three years of the projection, thus reflecting the slowing down in the average rate of growth of the labour force towards the end of the projection horizon.

### 3.5 COMPARISON WITH OTHER STUDIES

Statistics Canada (91-514, 1974) has published population projections for Canada and the provinces under a variety of assumptions using a regionally disaggregated population projection model (Statistics Canada (91-516, 1975)) and using the 1971 census distribution as the starting population.

TABLE 3.13

ONTARIO LABOUR FORCE PROJECTIONS,  
SELECTED AGE-SEX GROUPS, 1976-87

	1976	1977	1978	1979	1980	1981
ONTARIO : LABOUR FORCE BY SEX AND AGE (MILLIONS)						
MALES, TOTAL	2.420	2.480	2.534	2.588	2.642	2.695
15 TO 19	0.232	0.236	0.240	0.244	0.247	0.245
20 TO 24	0.314	0.325	0.336	0.344	0.351	0.360
25 TO 44	1.100	1.135	1.164	1.198	1.236	1.273
45 TO 64	0.712	0.720	0.728	0.734	0.739	0.746
65 & OVER	0.062	0.064	0.066	0.068	0.070	0.071
FEMALES, TOTAL	1.524	1.571	1.615	1.649	1.695	1.744
15 TO 19	0.205	0.208	0.211	0.215	0.218	0.217
20 TO 24	0.258	0.266	0.272	0.279	0.285	0.292
25 TO 44	0.672	0.702	0.732	0.747	0.778	0.812
45 TO 64	0.368	0.375	0.380	0.386	0.392	0.401
65 & OVER	0.020	0.020	0.021	0.021	0.021	0.022
DISTRIBUTION OF LABOUR FORCE BY SEX AND AGE (PER CENT)						
MALES, TOTAL	61.361	61.229	61.073	61.086	60.924	60.703
15 TO 19	5.883	5.833	5.786	5.752	5.690	5.520
20 TO 24	7.964	8.032	8.091	8.132	8.100	8.109
25 TO 44	27.906	28.015	28.057	28.285	28.503	28.682
45 TO 64	18.044	17.779	17.553	17.316	17.028	16.800
65 & OVER	1.563	1.570	1.586	1.602	1.603	1.593
FEMALES, TOTAL	38.639	38.771	38.927	38.914	39.076	39.297
15 TO 19	5.210	5.128	5.084	5.082	5.029	4.886
20 TO 24	6.553	6.567	6.557	6.586	6.574	6.588
25 TO 44	17.037	17.338	17.635	17.644	17.942	18.295
45 TO 64	9.328	9.248	9.155	9.104	9.035	9.034
65 & OVER	0.511	0.490	0.497	0.499	0.495	0.494

SOURCE: Projections by the Institute for Policy Analysis, University of Toronto.



TABLE 3.13 (CONT.)

ONTARIO LABOUR FORCE PROJECTIONS,  
SELECTED AGE-SEX GROUPS, 1976-87

	1982	1983	1984	1985	1986	1987
ONTARIO : LABOUR FORCE BY SEX AND AGE (MILLIONS)						
MALES, TOTAL	2.746	2.793	2.839	2.881	2.917	2.954
15 TO 19	0.243	0.235	0.228	0.223	0.219	0.220
20 TO 24	0.367	0.374	0.379	0.380	0.374	0.368
25 TO 44	1.312	1.351	1.391	1.429	1.469	1.501
45 TO 64	0.752	0.760	0.768	0.772	0.777	0.785
65 & OVER	0.072	0.073	0.074	0.076	0.078	0.080
FEMALES, TOTAL	1.800	1.848	1.900	1.944	1.985	2.037
15 TO 19	0.214	0.208	0.202	0.198	0.196	0.196
20 TO 24	0.300	0.306	0.312	0.314	0.309	0.302
25 TO 44	0.852	0.890	0.930	0.968	1.010	1.061
45 TO 64	0.412	0.422	0.433	0.440	0.445	0.452
65 & OVER	0.022	0.023	0.024	0.024	0.025	0.026
DISTRIBUTION OF LABOUR FORCE BY SEX AND AGE (PER CENT)						
MALES, TOTAL	60.407	60.177	59.907	59.710	59.505	59.189
15 TO 19	5.338	5.065	4.821	4.617	4.476	4.411
20 TO 24	8.073	8.051	7.987	7.879	7.627	7.368
25 TO 44	28.866	29.112	29.342	29.628	29.958	30.078
45 TO 64	16.550	16.381	16.195	16.009	15.851	15.725
65 & OVER	1.579	1.569	1.563	1.576	1.593	1.607
FEMALES, TOTAL	39.593	39.823	40.093	40.290	40.495	40.811
15 TO 19	4.701	4.483	4.262	4.102	3.997	3.922
20 TO 24	6.592	6.592	6.578	6.503	6.303	6.051
25 TO 44	18.753	19.164	19.621	20.064	20.607	21.265
45 TO 64	9.054	9.088	9.135	9.118	9.076	9.057
65 & OVER	0.493	0.496	0.497	0.504	0.511	0.517

SOURCE: Projections by the Institute for Policy Analysis, University of Toronto.

TABLE 3.14

TOTAL ONTARIO LABOUR FORCE PROJECTIONS, 1975-87

(Millions)

YEAR	TOTAL MALES	TOTAL FEMALES	TOTAL	PERCENTAGE CHANGE
1975 (Actual)	2.377	1.484	3.861	-
1976	2.420	1.524	3.943	2.1
1977	2.480	1.570	4.051	2.7
1978	2.534	1.615	4.149	2.4
1979	2.588	1.649	4.236	2.1
1980	2.642	1.695	4.337	2.2
1981	2.695	1.744	4.439	2.4
1982	2.746	1.800	4.545	2.4
1983	2.793	1.848	4.642	2.1
1984	2.839	1.900	4.739	2.1
1985	2.881	1.944	4.825	1.8
1986	2.917	1.985	4.902	1.6
1987	2.953	2.036	4.990	1.8

SOURCE: Table 3.13

Unfortunately none of the combinations of assumptions used in the publication correspond directly to those used in this chapter. Projection A assumes high fertility, international migration and interprovincial migration, projection B assumes medium fertility, immigration and migration, projection C assumes low fertility with medium immigration and migration, while projection D assumes low fertility and low migration with medium immigration.<sup>13</sup>

The projection developed in this paper uses a relatively low fertility assumption and an immigration assumption midway between Statistics Canada's medium and high assumptions. The resulting projected population levels for Ontario in 1987 range from a high of 11.188 million persons (projection A) to a low of 9.675 million persons (projection D). This can be compared to a projection of 9.725 million persons developed in Section 3.2.3 and a range of projections from a low of 9.042 million persons (with zero net provincial immigration and migration) to a high of 9.998 million persons (with 70,000 net provincial immigration and migration) presented in Appendix 3.2. In general, the low fertility and medium immigration assumptions used in this chapter, together with the projected slight increase in net loss attributable to net interprovincial migration and emigration, results in a total population projection that is in the lower part of the published Statistics Canada projection range. In all cases, the change in the projected composition of the population is

---

13 See Statistics Canada (91-514, 1974, 59) for details. The high, medium and low fertility assumptions are 2.6, 2.2 and 1.8, the immigration assumptions are 100,000 and 60,000 net (or 160,000 and 120,000 gross) per year with zero net being the low case, while the migration assumptions are 450,000, 435,000 and 218,000 per year respectively.

is very similar. Finally, it should be noted that the Statistics Canada projections use the 1971 population distribution as the starting population, whereas the projections presented in this chapter use the (estimated) 1975 population distribution.

Dallimore and Lampert (1973) also used the 1971 census distribution to develop (five year) population and labour force projections for Ontario, but their projections were undertaken with an Ontario-specific population projection model. Using a slightly declining period total fertility rate (from 2.2 in 1971 to 2.1 in 1986) and two net immigration plus migration assumptions (of 30,000 and 60,000 persons per year), Dallimore and Lampert project 1986 total populations of 9.348 and 9.854 million persons respectively. The comparable figure in Section 3.2.3 is 9.599 million persons. In general, both the totals and composition are quite consistent with the population projections developed in this chapter (although here they are developed on a single year basis). Dallimore and Lampert discuss the influences on labour force participation for different age-sex groups, but no quantitative relationships are presented. Their quantitative projections (see Dallimore and Lampert, 1973, 78) for 1976, 1981 and 1986 appear to be a qualitative synthesis of these influences. They show slightly decreasing participation rates for the 14 to 19 year age groups, increasing participation rates for the 20 to 24 year age groups, constant participation rates for 25 years and over male groups and 65 years and older females and increasing participation rates for prime age (25 to 64 years) females. These trends are slightly



different from those presented in Section 3.3.3 which incorporate more recent historical information. Based on their assumptions, the authors conclude that labour force growth will average around 3 per cent (2.9 and 3.3 per cent respectively, depending on the migration assumption) in the 1970s easing to average between 1 1/2 and 2 per cent (1.5 and 1.9 per cent respectively) after 1981. These results are generally consistent with the growth rates presented in this chapter.

More recently the Policy Planning Branch of the Ontario Ministry of Treasury, Economics and Intergovernmental Affairs (1976b) has published (five year) population and labour force projections for Ontario to 1995. The methodology employed uses the Statistics Canada model to obtain projection of the Canadian population and the Ontario model (apparently the same one used by Dallimore and Lampert) to obtain projections of the Ontario population. The latter, therefore, is not likely to be the same as the regional output produced by the Statistics Canada model. Presumably both use the 1971 population composition as the starting population. At the Canadian level, scenario A assumes low fertility (declining to 1.8 by 1985) and a net migration of 100,000 per year, while scenario B uses the same fertility assumption and a higher net migration (of 140,000 per year). At the Ontario level, steadily declining fertility rates are assumed (to 1.68 by 2001) and a net migration into Ontario of 50,000 (scenario A) and 25,000 (scenario B) are considered. In both cases, scenario A is considered the more likely. No adjustments were made to obtain the labour force source populations. Based on these assumptions, the 1985 population for Ontario



is projected as 9.101 (scenario B) or 9.505 (scenario A) million persons. The comparable figure developed in Section 3.2.3 is 9.472 million persons, which is very close to the scenario A estimate of the Ministry (although, again it can be noted that single year projections are developed in this chapter). The Ministry study also comments on some of the implications of the composition of the projected population and, since they are similar for this study, the reader is referred to the Ministry report for a summary of these comments.

To obtain labour force projections, the Ministry study "examines the prospects for changes in participation rates" by taking "account of historical experience as well as possible changes in future socio-economic conditions" (1976b, 3).<sup>14</sup> They show the rate for young (15 to 24 year) males rising, for prime (25 to 54 year) and mature (55 year and over) males rising very slightly and for all females rising quite substantially. Except for the prime and mature male groups, these are consistent with the projections developed in Section 3.3.3. With these assumptions, the total labour force for 1985 is projected to rise to 4.976 million persons which is slightly higher than the 4.824 figure presented in Table 3.14.

Besides these three studies, there have also been other studies of population and labour force growth for Ontario with particular emphasis on

---

14 The study assumes a relatively constant prime age male rate and then uses an aggregate projection from the TRACE model and Ministry projections of the remaining groups to give a possible range of figures, with "some judgment" being employed to reach a compromise (1976b, 4).

such matters as housing and education. For example, the Metropolitan Toronto Planning Department developed projections to 2001 primarily to assist planning in Metropolitan Toronto and area municipalities. Since these studies usually focus on particular subjects, which do not usually include the size, growth and composition of the labour force, they are not reviewed here. The general impression is, however, that the population projections and associated compositional changes are quite similar to those presented in this study and reviewed in this section.

In summary, it appears that all studies are in agreement on the changing composition of the Ontario population and are in fairly close agreement as to the possible size of the Ontario population over the next decade. Where labour force growth is projected there is some disagreement as to composition (primarily as a result of somewhat different participation rate assumptions), but the slowing down of the growth in the decade of the 1980s is noted in all studies. This study differs from one or all of the other studies reviewed in this section in four main respects: (1) single year projections are developed and presented rather than just five year projections, (2) the (estimated) 1975 population is taken as the starting population rather than the 1971 population, thus avoiding the problem of not agreeing with published figures for the intervening years, (3) detailed (ten) age-sex groups are considered in developing the labour force projections and (4) detailed econometrically estimated participation rate equations are developed to explain and project participation rate movements. In addition, adjustments are made to total population to obtain labour force source

population projections and the latest information is used to choose the fertility and net immigration assumptions. As might be expected, however, the results are not radically different from those reported elsewhere, although, as outlined above, the methodology and format is somewhat different.

### 3.6 CONCLUSIONS

The following general conclusions emerge from this chapter:

(i) The Ontario population is projected to total 9.725 million persons by the year 1987, a gain of 1.25 million persons over 1977. This is based on the assumptions of a period total fertility rate of 1.85 and a net intake of 50,000 persons annually into the province.

(ii) There will be a significant aging of the Ontario population over the projection horizon with the proportion of persons of pensionable age increasing about two percentage points and those of school age decreasing over five percentage points.

(iii) Overall population growth is likely to slow from recent annual rates of approximately 2 per cent to an annual average of 1.4 per cent over the projection horizon. The growth rate slows noticeably in the 1980s.

(iv) Labour force participation rate equations suggest that medium-term factors such as urbanisation, schooling, fertility and old age security are important determinants in addition to

the traditional income and labour market variables.

(v) Participation rate projections show increasing rates for the young (14 to 24 year) age groups, and prime age (25 to 64 year) female groups and slightly decreasing rates for the prime age male groups. Participation rate projections for the old (65 years and over) age groups show little change.

(vi) The changes in participation rates and immigration, as well as the composition of the population, have been important determinants of labour force growth in Ontario.

(vii) Based on the projections for population and participation rates, the growth in the Ontario labour force is projected to slow down and average around 2 1/2 per cent annually in the late 1970s and early 1980s. By the mid-1980s growth rates below 2 per cent are projected. This results in a gain of about one million persons over the period 1977 to 1987.

(viii) The labour force composition is projected to show a decline in the percentage of young people (15 to 24 years) and an increase in the percentage of women, especially prime age (25 to 44 years) women. The projected gain of about one million persons is divided almost equally between males and females.

Although this study differs from other similar studies in a number of important respects, these conclusions with respect to future population and

labour force growth in Ontario are broadly consistent with those reported elsewhere. These findings must form the basis for the development of future policy with respect to both the demographic and the labour market sectors of the provincial economy in Ontario and with respect to broader social and economic policy in the province over the next decade. A brief discussion of these issues can be found in Chapter Eight of this study.



THE ONTARIO POPULATION PROJECTION  
MODEL

An Ontario population projection model was developed to obtain the population projections presented in this chapter (see Section 3.2.3 and Appendix 3.2). The model was developed using the same structure as used by Cohen (1976), which in turn follows the methodology outlined by Statistics Canada (91-516, 1975). This appendix presents a brief summary of the model structure. The reader is referred to the original publications for a more detailed description of the model structure.

Population models are recursive. They project the composition of the present population based on the composition of the population in the previous period. Consequently, any population projection model must be given the composition of the population in some initial (or starting) period and then must calculate the three elements of population change: births, deaths and net migration. In the model used in this study, births are calculated based on an exogenously supplied period total fertility rate and an endogenously determined age distribution of fertility, deaths are calculated endogenously by multiplying the number of people in each age-sex group by the relevant survival rates (which are incorporated directly into the model) and total net migration must be specified exogenously (although it is allocated over the various age-sex groups within the model using a distribution developed by the Ontario government).

The model developed for this study is an annual model. Consequently, the user of the Ontario population projection model must specify:

- (i) the starting population, with a choice of either 1971 or 1975,

- (ii) the assumed period total fertility rate on an annual basis,
- (iii) the assumed level of annual net migration into the province  
(called the 'residual' in the text) on an annual basis,
- and (iv) the terminal year for the projection.

The exact form of these instructions is outlined in Cohen (1976).

The Ontario model differs from the Canadian model developed in Cohen in only two important respects: the age-distribution of fertility is Ontario-specific and the level of net migration, and not the levels of gross migration and emigration, must be specified by the user. This latter modification is necessitated by the lack of published data on interprovincial flows of persons and hence the difficulty of determining the gross figures. The age-sex allocation matrix is Ontario-specific and is therefore different. The national survival rates are used in the Ontario model as there is very little difference between the Ontario and Canadian survival rates. The Ontario model differs from the Statistics Canada model in that it is a separate model for which separate regional assumptions can be made and is not embodied in an inter-regional Canadian model.

For projection purposes the age distribution and the survival rates change over time. Statistics Canada has developed a distribution which uses the period total fertility rate and the mean and modal ages of fertility to compute a full set of age-specific fertility rates. By changing the mean and modal ages of fertility, the age-specific fertility rates change. The assumptions published by Statistics Canada are incorporated into the Ontario model (for example, the mean age of fertility declines from 26.8 years in 1971 to 25.7 years by 1985 et. seq.), but they can be easily changed by the user if

desired. The survival rate projections are also based on the published Statistics Canada figures which show declining infant and child mortality, slight declines in mortality among adults and little change in the death rates for the age groups over 60 years. These five year projections are smoothed internally in the model using Sprague multipliers (see Cohen or Statistics Canada for details). Finally, the age-sex distribution for net migration is assumed fixed throughout the projection period. A population projection is obtained, therefore, by applying the user specified assumptions to these endogenous assumptions within the recursive model format. In this way the Ontario population for any year is calculated from the population in the previous year by adding the calculated number of live births by age and sex, subtracting the calculated number of deaths by age and sex and adding the calculated number of net migrants by age and sex.

By way of illustration and validation, the Ontario population projection model was applied over the historical period between 1971 and 1975. Using actual figures for period total fertility and net migration (estimated on a June 1 to May 31 basis) and letting the model endogenously generate births and deaths, a total population of 8.232 million persons was obtained for 1975. This is only 0.006 million persons (or 0.007 per cent) above the actual figure of 8.226 million persons. Also, between 1974 and 1975 the model estimated births at 124.9 and deaths at 60.3 thousand persons, whereas the estimated actual figures were 124.2 and 60.3 thousand persons. Consequently, the errors are quite small and the Ontario model performs very well in explaining the population growth over the historical period between 1971 and 1975. All other projections reported in this chapter and in the following appendix use the 1975 population as the starting population.

# Appendix 3.2

## PROJECTED ONTARIO POPULATION UNDER ALTERNATIVE 'RESIDUAL' ASSUMPTIONS, SELECTED YEARS (Thousands)

'RESIDUAL' *	YEAR					
	1977	1979	1981	1983	1985	1987
0	8,358	8,494	8,634	8,775	8,912	9,042
10,000	8,379	8,536	8,698	8,863	9,024	9,179
15,000	8,389	8,557	8,731	8,907	9,080	9,247
20,000	8,399	8,578	8,763	8,951	9,136	9,315
25,000	8,410	8,599	8,795	8,995	9,192	9,383
30,000	8,420	8,620	8,828	9,039	9,248	9,452
35,000	8,430	8,641	8,860	9,083	9,304	9,520
40,000	8,440	8,662	8,892	9,127	9,350	9,588
45,000	8,451	8,683	8,924	9,171	9,416	9,657
50,000	8,461	8,704	8,957	9,215	9,472	9,725
55,000	8,471	8,726	8,989	9,259	9,528	9,793
60,000	8,481	8,747	9,021	9,303	9,584	9,861
70,000	8,502	8,789	9,086	9,391	9,695	9,998

\* Net International Immigration plus Net Interregional Migration.

SOURCE: Projections by the Institute for Policy Analysis, University of Toronto.



PARTICIPATION RATE EQUATIONS

As outlined in Section 3.3.1, much of the empirical work on labour force participation has concentrated on the effects of short-run, labour market specific determinants. Only recently have other determinants, particularly with respect to the underlying medium-term trends, been suggested. Since this is the focus of this study, the determinants tested included both the traditional labour market variables and the more general longer run determinants. This appendix presents a brief summary of the results of this research. These results form the basis for the projections presented in Section 3.3.3.

The determinants can be conveniently divided into two main groups:

1) general influences affecting all age-sex categories, and 2) specific influences which are expected to apply to only certain age-sex categories.

1) General Influences:

(i) Income - One would expect higher earnings opportunities to induce more participation from all age-sex groups. Both real per capita disposable income, and real per capita wage income were tested. One would expect the former to be less satisfactory in that disposable income includes "unearned" income which could have the opposite effect on labour force participation. Surprisingly, it performed better in the equations than the variable based on wage income and was therefore retained in the final specifications.



(ii) Employment - The availability of jobs can move participation in either direction depending on whether the encouraged or discouraged worker effect predominates. To test the influence of employment opportunities, both the Ontario unemployment rate and employment as a proportion of the population fourteen years and over were tested. It should be noted that although the latter was retained for the younger age groups, neither of these usual measures of labour market conditions performed well.

(iii) Income Maintenance - A generally negative influence on participation rates is the availability of alternative means of support supplied by various income maintenance programmes. Both unemployment insurance, through lengthening the duration of unemployment, and old age security, through inducing early retirement, would lower participation. It might be expected that these factors would be primarily relevant for males, insofar as they are the main 'breadwinners', because they reduce the pressure to be constantly employed. To approximate the latter determinant, both the average individual real maximum monthly payment and a proxy variable constructed as the real per capita value of old age security transfers were tested in the 65 and over group equations. They were both significant and the latter variable is included in the reported results. As a proxy for the average

unemployment insurance benefits received by a typical Canadian, the total real funds paid out by the federal government per year was divided by the total population. In addition, in an attempt to proxy the opportunity cost of unemployment insurance, the ratio of total unemployment insurance payments to total wages and salaries was tested in the participation rate equations. Neither measure turned out to have significant explanatory power.

(iv) Urbanisation - The final general influence on participation rates that was tested was the level of urbanisation in the province. Defined as the proportion of the total Ontario population living in the five largest census metropolitan areas, it was expected that this variable would raise participation by providing more opportunities for employment, particularly for prime age females. Since the data is only available in five year intervals the intervening observations were calculated by interpolation (see Foot (1976, 249)).

## 2) Specific (Age-Sex) Influences:

(i) School Enrolment - Schooling (primarily secondary) would be a natural alternative to working for the youngest group of potential participants in the labour force. To test this hypothesis, secondary school enrolment (as a proportion of the relevant Ontario population) was used in the equations for the youngest males and females and was found to be significant for both sexes. University enrolment (as a proportion of the relevant Ontario population) was used to re-

present the similar influence for people between the ages of twenty and twenty-four. As noted, the specification for the two schooling variables took the form of enrolments as a proportion of the relevant age group, 15 to 19 years for secondary school and 20 to 24 years for university. Ideally these variables should be disaggregated by sex but this was not possible.

(ii) Fertility - Labour force participation by women between twenty and twenty-four (and perhaps between twenty-five and forty-four) would be determined in part by the fertility rate. The variable tested was the period total fertility rate which is the variable used in the population model.

(iii) Adjustment - For the prime age working groups, especially males, a lagged dependent variable was introduced to test a partial adjustment model, where it is assumed that the desired level of labour force participation is determined by the other explanatory variables in the specification.

All of these determinants play a role in the labour force participation equations estimated for the ten age-sex groups presented in Table A3.1. Participation rates in the younger age groups (males and females aged 14 to 19 years) were found to be positively related to income opportunities (with a lag for the female group) and negatively related to school enrolment. In addition, the estimated results confirmed the impact of a discouraged

worker effect for these age groups - an effect which is confirmed in other studies. Similar results were obtained for the next youngest age groups (20 to 24 years). For females the discouraged worker effect was found to be important, as was a negative influence of the fertility rate. This indicates the influence of child birth (and possibly child rearing) on female participation rates in this age group. For the males aged 20 to 24 years a significant negative effect of university enrolment was found to predominate in addition to the income effect. This suggests that increased tertiary educational opportunities contribute to a downward movement in male labour force participation, at least in this age group. No such effect could be found for females. Urbanisation was found to have an important effect on the participation rates of all females aged 25 and over. The estimated coefficient was positive suggesting that increased urbanisation has led to increased female labour force participation. This could have resulted either from better employment opportunities facilitated by urbanisation or from the changing expectations of the role of women in the labour force which is probably encouraged by changing urbanisation patterns. For males aged 25 years and over, who, in the past at least, have been viewed as the major family income earners, the results confirmed the stability of the rates, with the coefficient on the lagged dependent variable suggesting a slower response for the 45 to 64 year age group than for the other two groups. In addition, a tradeoff influence was tested and found to be significant in the prime age male groups, as seen by the inclusion of the corresponding female participation rate variable in these equations. A similar

TABLE A3.1

## ONTARIO PARTICIPATION RATE EQUATIONS, 1956-74

(t-statistics in parentheses)

Dependent Variable	Intercept	Income	Employment	Urbanisation	Enrolment: School (1) University (2)	FERT(1) RROA(2)	Lagged Dependent Variable	Other	R <sup>2</sup>	SEE (%)	DW
ORPY1F	11.840 (0.43)	5.816L (2.68)	0.661 (1.23)		-42.216(1) (6.13)				.7797	1.475	1.28
ORPY2F	31.191 (1.47)	2.061 (0.91)	0.646 (1.84)			-5.664(1) (3.96)			.9755	0.996	2.33
ORPP1F	-14.316 (3.59)	11.989 (20.00)		0.407 (4.00)					.9904	0.680	2.13
ORPP2F	-75.937 (5.42)	1.277 (1.35)	0.521 (2.14)	1.567 (15.04)					.9876	0.638	2.49
ORP0F	- 0.542 (0.15)			0.203 (2.45)		-4.303(2) (6.16)			.8001	0.515	2.02
ORPY1M	33.945 (1.44)	5.959 (3.41)	0.576 (1.25)		-56.674(1) (9.75)				.9021	1.181	1.46
ORPY2M	87.725 (51.58)	6.201 (5.67)			-119.968(2) (12.28)				.9797	0.538	2.71
ORPP1M*	45.472 (2.08)						0.554 (2.59)	-0.045(a) (2.21)	.9523	0.147	(1.76)
ORPP2M*	4.133 (0.28)						0.973 (6.61)	-0.050(b) (1.62)	.8906	0.426	(2.99)
ORP0M	17.049 (2.34)					-7.296 (2.51)	0.606 (3.77)		.9689	1.088	2.37



## NOTES TO ACCOMPANY TABLE A3.1

## Definition of Dependent Variables:

ORPY1F = Ontario Participation Rate, young females, 14 to 19 years.  
 ORPY2F = Ontario Participation Rate, young females, 20 to 24 years.  
 ORPP1F = Ontario Participation Rate, prime females, 25 to 44 years.  
 ORPP2F = Ontario Participation Rate, prime females, 45 to 64 years.  
 ORPOF = Ontario Participation Rate, old females, 65 years and over.

The comparable definitions hold for the male categories.

## Definition of Independent Variables:

Income = Real, per capita disposable income in Ontario.

Employment = Employment as a percentage of the labour force source population 14 years and over in Ontario.

Urbanisation = Percentage of the total Ontario population living in the five largest census metropolitan areas.

Enrolment: School (1) = Secondary school enrolment in Ontario as a proportion of the Ontario population aged 15 to 19 years.

Enrolment: University (2) = University enrolment in Ontario as a proportion of the Ontario population aged 20 to 24 years.

Fertility (denoted FERT (1)) = Period total fertility rate for Ontario.

Old Age Security (denoted RROA (2)) = Real, per capita old age security transfers in Canada (constructed from variables in the TRACE data bank).

Other = Adjustment variables: (a) ORPP1F and (b) ORPP2F

## Other Notes:

L = variable lagged one period

\* Equations where a lagged variable appears are estimated over the period 1957-74. Care should be taken in interpreting the DW statistic for those equations where the lagged dependent variable appears. These values are presented in parentheses.

influence was not found for the same female age groups. Finally, the old age security variable performed very well for the two older (65 years and over) age groups. It is interesting to note that, based on these results, unemployment insurance does not appear to have had a significant influence on participation rates in Ontario.

The equations presented in Table A3.1 all appear to capture the medium-term trends quite satisfactorily. The equation with the least satisfactory performance in this regard is for young (14 to 19 year) women. Generally, the error characteristics of the equations indicate that they would be satisfactory for projection purposes.

These equations were estimated unconstrained; that is, no account was taken of the fact that participation rates must lie between zero and unity. It might be expected that as participation rates approach unity a non-linear response might be more appropriate. To test this each of the above specifications was tested with a non-linear influence of the income variable.<sup>15</sup> However, in every case the linear specification provided the superior explanation over the historical period. Although, of course, this does not necessarily mean that it will be superior over a projection period, the linear specification was retained for the projections developed in Section 3.3.3.

---

15 Both the inverse and the log of the income variable were tested. See Johnston (1972, 50-52) for an outline of these non-linear specifications. An alternative specification would be the logistic model with the upper asymptote parameter constrained to unity. This model must invariably be estimated by nonlinear least squares. Unfortunately it was not possible to implement this model for inclusion in this study.

By way of comparison, participation rate equations of the form

$$\text{OPR}_{jt} = B_0 + B_1 \text{CPR}_{jt} \quad j = 1 \dots 10$$

where  $\text{OPR}_{jt}$  = Ontario participation rate for group  $j$  at time  $t$  and  $\text{CPR}_{jt}$  = Canadian participation rate for group  $j$  at time  $t$  were estimated for all ten age-sex groups. If the two rates were identical  $B_0 = 0$  and  $B_1 = 1$  would be expected. If the ratio between the two remained approximately unchanged, only  $B_0 = 0$  would be expected with  $B_1$  approximating the relevant ratio ( $> 1$  if  $\text{OPR} > \text{CPR}$  and vice versa). If the difference between the two remained approximately unchanged then  $B_0 \neq 0$  and  $B_1 = 1$  might be expected. A combination of these circumstances can produce  $B_0 \neq 0$ ,  $B_1 \neq 1$ .

The results are summarized in Table A3.2 where  $R^2 > 0.9$  for 8 of the ten categories. The two exceptions are the young (14 to 19 years) and old (65 years and over) females. It can be noted that whenever  $B_0 < 0$ ,  $B_1 > 1$  (and vice versa). Most intercepts are significantly different from zero, hence rejecting the hypothesis of an unchanged ratio. Most slopes are significantly different from unity, hence rejecting the constant difference hypothesis. A comparison of the results presented in Tables A3.1 and A3.2. shows that there is little to choose between them for medium-term projection purposes (with the possible exception of the older females). In fact a comparison of the  $R^2$  shows that the relative superiority of one specification for males is exactly the opposite for females and vice versa. In general, the comparison shows a close correlation between the  $R^2$  thus suggesting that a good (or poor) explanation will occur in both specifications. Since the theoretical foundations for the equations presented

TABLE A3.2

LINKING EQUATIONS FOR ONTARIO PARTICIPATION RATES, 1956-74

(t-statistics in parentheses)

Dependent Variable	B <sub>0</sub>	B <sub>1</sub>	R <sup>2</sup>	SEE (%)	DW
1. ORPY1F	-13.707 (2.08)	1.483 (7.18)	.7522	1.469	1.16
2. ORPY2F	3.165 (1.18)	0.971 (19.64)	.9578	1.229	1.18
3. ORPP 1F	5.823 (9.97)	0.967 (57.22)	.9948	0.483	1.65
4. ORPP 2F	5.626 (7.37)	0.969 (40.37)	.9897	0.547	1.52
5. ORP OF	- 0.155 (0.10)	1.178 (3.99)	.4832	0.803	0.48
6. ORPY 1M	0.944 (0.39)	0.983 (16.96)	.9442	0.838	1.74
7. ORPY 2M	-12.629 (2.94)	1.151 (23.53)	.9702	0.632	1.60
8. ORPP 1M	-39.322 (4.11)	1.413 (14.39)	.9254	0.177	0.76
9. ORPP 2M	10.454 (2.48)	0.909 (19.65)	.9580	0.251	2.89
10. ORPOM	- 1.888 (3.11)	1.196 (52.37)	.9938	0.493	1.46

NOTE: See the notes accompanying TABLE A3.1 for definitions of the dependent variables and the text for a discussion of the estimated specification.



in Table A3.1 are to be preferred, these equations were used to develop the participation rate projections presented in Section 3.3.3.

To develop these projections, it was necessary to obtain projections for all of the independent variables in Table A3.1. These were obtained from five different sources. First, the output from the TRACE model projection for the national economy (see Chapter Two) was used to obtain projections for the Canadian income variable and for the old age security variable. Second, the Ontario income variable was obtained from the national variable using a linking equation (described in Section A5.3). Third, the numerator of the employment variable was obtained from the employment projections developed in Chapter Six, while the denominator was obtained from the Ontario population projection model (described in Appendix 3.1). Fourth, the lagged dependent variables and two participation rate variables were obtained as the projected values from previous solutions of the relevant equations; namely, the solution from the previous year and the solution from the other relevant participation rate equations in the same year respectively. Finally, all other variables were projected exogenously at their most recent levels throughout the projection period, thus implying that changes in the projected participation rates are not determined by changes in these variables. The level of urbanisation was projected at 53 per cent (of the Ontario population living in the five largest census metropolitan areas), the fertility rate at 1.85 (average births per woman over her child bearing years), and the proportions of school enrolment and university enrolment at 0.75 and 0.21 (total enrolments



divided by total population in certain age groups) respectively. Holding these latter two variables unchanged in light of projected increases in the participation rates of the younger age groups implicitly assumes somewhat increased enrolments from those not in these age groups.

Given the use of the computer to generate the projections presented in this study, it is a relatively easy task to explore the implications of alternative assumptions, such as those presented in Chapter Seven or for different values for the exogenous variables, for the participation rate projections presented in Section 3.3.3. Since there is a plethora of possible alternatives, no specific alternative participation rate projections are presented in this study.

## Chapter Four

### CAPITAL MARKETS

by

James E. Pesando

#### 4.1 INTRODUCTION

The outlook for the Canadian capital market is clearly relevant to any assessment of the prospects for the Province of Ontario during the next ten years. Indeed, given the importance of international capital flows, the outlook for the capital markets of other countries, particularly the United States, is relevant as well. The first section of this chapter contains a brief discussion of the prospects for the Canadian capital market as a whole, including the oft-cited possibility of the development of a "capital shortage". Also included in this section is an assessment of likely developments in the United States and the way in which these may affect the outlook for capital markets in Canada. The second section of the chapter examines the major developments associated with the financing requirements of the Province of Ontario over the period 1977-1987. The central issues deal with the reduced availability of non-public sources of funds such as the Canada Pension Plan, the continued dependence on foreign capital markets as a source of funds, and the possible restraining impact of financial considerations on both provincial spending and the capital expenditures of Ontario Hydro.

#### 4.2 THE OUTLOOK FOR THE CANADIAN CAPITAL MARKET: 1977 - 1987

Most discussions of the outlook for capital markets in Canada and the United States focus great attention on whether or not there is likely to exist a "capital shortage" (Wechtel, Sametz and Shuford (1976)). The concern about a possible "capital shortage" appears to have two dimensions: first, that the rate of real capital accumulation will be insufficient to permit a reasonably rapid rate of growth of real GNP and/or to eliminate potential bottlenecks which could lead to upward pressure on prices; and second, that the projected level of capital investment cannot be financed at reasonably stable rates of interest (Sinai and Brinner (1975), Bosworth, Duesenberry and Carron (1975)). To a large extent, the concern about a possible "capital shortage" is overstated. The amount of private investment will continue to be determined by the expected profitability of that investment, which is based on a comparison of its expected return with the cost of capital. Adjustments in interest rates -- an important element in the cost of capital -- will continue to ensure that the flow of saving is efficiently allocated among competing uses. To the extent that an historically large demand for real investment exists, whether for energy, pollution abatement or other needs, realized investment is also likely to be large by historical standards. The increased demand for investment funds may place upward pressure on interest rates, but this is nothing more than the traditional mechanism by which the flow of saving is both augmented and rationed among competing demands.

There is, however, legitimate concern with respect to a related issue.

To the extent that the Government sector dissaves and/or subsidizes certain types of capital expenditures, there exists a demand for funds which does not have to meet the market test of profitability. This demand, in turn, might place sufficient pressure on interest rates so as to render a large portion of erstwhile private investment no longer profitable. Even this type of problem, however, is only indirectly linked to the concept of a "capital shortage". Its proper evaluation depends ultimately on the assessment of the external benefits conferred by Government spending and/or subsidized capital investments. Since this assessment is beyond the scope of the present analysis, the concept of a "capital shortage" per se receives little attention in the subsequent analysis. Instead, the analysis focuses on two issues: (1) the amount of real investment projected for the period 1977 - 1987, together with the sources of saving necessary to finance that investment; and (2) the impact of inflation on corporate balance sheets, together with its more general impact on the financing of real investment.

Consider first the TRACE projections for both domestic capital formation and the financing of that capital formation. These figures, drawn from the high price energy scenario, are reproduced in Table 4.1. To place them in a broader perspective, the projections of the key variables together with some historical data are summarized in Table 4.2. All figures in this latter table are expressed as a percentage of GNP.

The figures serve to emphasize the fact that capital investment is likely to be high by historical standards throughout the 1977 - 1987 period.

TABLE 4.1

## CONSOLIDATED CAPITAL FINANCE ACCOUNT

	1975	1976	1977	1978	1979	1980	1981
	BILLIONS OF CURRENT DOLLARS						
GROSS DOMESTIC CAPITAL FORMATION	38.226	44.764	49.652	54.810	61.583	67.144	74.756
BUSINESS GROSS FIXED CAPITAL FORMATION	32.252	36.116	38.701	42.278	47.880	52.363	58.722
GOVERNMENT GROSS FIXED CAPITAL FORMATION	6.548	7.272	8.038	8.902	9.838	10.725	11.745
VALUE OF PHYSICAL CHANGE IN INVENTORIES	-0.424	0.866	1.184	1.200	1.434	1.626	1.859
RESIDUAL ERROR OF ESTIMATE	-0.150	0.510	1.730	2.430	2.430	2.430	2.430
FINANCING OF GROSS DOMESTIC CAPITAL FORMATION	38.226	44.764	49.652	54.810	61.583	67.144	74.756
PERSONAL SAVING	11.570	10.168	11.209	12.440	13.330	14.102	15.081
ADJUSTMENT ON GRAIN TRANSACTIONS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GOVERNMENT SAVING	-0.920	2.446	3.969	4.475	5.673	7.085	8.706
UNDISTRIBUTED CORPORATE PROFIT	8.079	10.095	11.132	12.876	14.668	16.165	18.383
UNDIST GOVT BUSINESS ENTERPRISE PROFIT	0.412	0.442	0.474	0.509	0.546	0.586	0.629
INVENTORY VALUATION ADJUSTMENT	-4.186	-3.646	-2.922	-2.902	-2.632	-2.374	-2.357
CAPITAL ASSISTANCE	0.336	0.376	0.416	0.456	0.496	0.536	0.576
CAPITAL CONSUMPTION ALLOWANCES AND MISCELLANEOUS VALUATION ADJUSTMENTS	17.800	20.469	22.936	25.405	27.912	30.537	33.341
SURPLUS (-) OR DEFICIT (+) OF CANADA ON CURRENT ACCOUNT WITH NON-RESIDENTS	4.980	4.926	4.170	3.997	4.032	2.952	2.841
RESIDUAL ERROR OF ESTIMATE	0.150	-0.510	-1.730	-2.430	-2.430	-2.430	-2.430
STATISTICAL DISCREPANCY	0.005	-0.003	-0.002	-0.015	-0.012	-0.014	-0.015



TABLE 4.1 (CONT.)

## CONSOLIDATED CAPITAL FINANCE ACCOUNT

	1982	1983	1984	1985	1986	1987
	BILLIONS OF CURRENT DOLLARS					
GROSS DOMESTIC CAPITAL FORMATION	84.185	91.856	103.031	108.297	107.251	113.300
BUSINESS GROSS FIXED CAPITAL FORMATION	66.703	73.191	82.710	86.947	85.143	89.167
GOVERNMENT GROSS FIXED CAPITAL FORMATION	12.905	14.133	15.521	17.001	18.513	20.255
VALUE OF PHYSICAL CHANGE IN INVENTORIES	2.146	2.102	2.369	1.918	1.164	1.447
RESIDUAL ERROR OF ESTIMATE	2.430	2.430	2.430	2.430	2.430	2.430
FINANCING OF GROSS DOMESTIC CAPITAL FORMATION	84.185	91.856	103.031	108.297	107.251	113.300
PERSONAL SAVING	16.558	17.413	18.599	19.148	18.726	19.065
ADJUSTMENT ON GRAIN TRANSACTIONS	0.0	0.0	0.0	0.0	0.0	0.0
GOVERNMENT SAVING	10.462	12.050	14.184	14.124	12.181	12.089
UNDISTRIBUTED CORPORATE PROFIT	21.076	22.899	25.741	26.824	26.709	29.039
UNDIST GOVT BUSINESS ENTERPRISE PROFIT	0.675	0.724	0.777	0.834	0.894	0.960
INVENTORY VALUATION ADJUSTMENT	-2.480	-2.905	-3.125	-3.520	-3.784	-3.659
CAPITAL ASSISTANCE	0.616	0.656	0.696	0.736	0.776	0.816
CAPITAL CONSUMPTION ALLOWANCES AND MISCELLANEOUS VALUATION ADJUSTMENTS	36.368	39.717	43.326	47.245	51.434	55.991
SURPLUS (-) OR DEFICIT (+) OF CANADA ON CURRENT ACCOUNT WITH NON-RESIDENTS	3.354	3.749	5.276	5.348	2.754	1.436
RESIDUAL ERROR OF ESTIMATE	-2.430	-2.430	-2.430	-2.430	-2.430	-2.430
STATISTICAL DISCREPANCY	-0.015	-0.016	-0.013	-0.013	-0.010	-0.008

TABLE 4.2

GROSS CAPITAL FORMATION AND ITS FINANCING,  
AS PER CENT OF GROSS NATIONAL PRODUCT

---

ITEM	PERIOD			
	1960-69	1970-75	1976-81	1982-87
GROSS DOMESTIC CAPITAL FORMATION				
Business Gross Fixed Capital Formation	18.0	18.5	19.1	19.7
Government Gross Fixed Capital Formation	4.2	3.9	3.9	4.0
FINANCING OF GROSS DOMESTIC CAPITAL FORMATION				
Personal Saving	3.4	5.3	5.3	4.5
Government Saving	2.7	2.5	2.2	3.1
Undistributed Corporate Profits	3.8	4.6	5.7	6.2
Capital Consumption Allowance	11.9	11.2	11.2	11.2
Surplus (-) or Deficit (+) on Current Account	- 1.6	0.5	1.7	0.9

---

Source: Table 4.1 together with historical data

Note: Gross domestic capital formation includes financing of the change in inventories.

During this decade, business fixed investment (inclusive of residential construction) is expected to average 19.4 percent of GNP, compared to only 18.2 percent for the preceding 15 years. This outlook, which parallels the situation in the United States (Wachtel, Sametz and Shuford (1976)), raises the question of where the saving necessary to finance the investment will originate. In general, there are four potential sources: personal saving, corporate saving, government saving and foreign investment. The figures summarized in the two tables indicate that the sharp increase in investment spending in the period 1976 - 1985 will be financed by an increase in corporate saving, together with high personal saving and large capital inflows (implied by the large current account deficits). Note that the combined Government sector is projected to continue to be a net saver, although the magnitude of this saving in relation to GNP is lower in 1976-81 than in the previous decade. Personal saving is projected to remain at an historically high rate in spite of the fact that the real, after-tax returns to many savings vehicles continue to be negative. This tendency also mirrors (Sinai and Brinner (1975)) the situation envisioned for the United States. The inflow of foreign capital, presumably from the United States, also merits comment. The magnitude of this figure might be questioned on two grounds: first, Canada's more restrictive stance toward the inflow of capital from abroad; and second, the possibility that a "capital shortage" in the United States might ultimately be reflected in a reduction in U.S. investment abroad. The first concern is blunted in large part by the fact that much of the inflow of capital is likely to be in debt form, such as the foreign borrowings -- direct or guaranteed -- by munici-

pal and provincial governments. Similarly, for the reasons cited earlier, the prospect of a "capital shortage" in the United States also appears to be somewhat exaggerated, and with it the possibility of restrictions on foreign investment by U.S. residents and financial institutions.<sup>1</sup> To the extent that there is any non-price rationing of foreign demand for funds in the United States (see Footnote 8), there is no reason to believe that the situation will deteriorate over time.

The sources of saving necessary to meet the accelerated pace of real investment projected for the period 1977 - 1987 have been noted above. The TRACE projections indicate that the yield on long-term Government of Canada bonds will average around 7.5 percent in the forecast period. The rate of inflation, as measured by the implicit GNP deflator, averages slightly more than 4.5 percent, indicating a real return of slightly less than 3 percent on long-term Canada bonds. If high grade corporate bonds command about a 50 basis point premium over Canada bonds, these figures would suggest a real corporate yield of slightly less than 3.5 percent. This figure is, at best, only moderately higher than its historical average.<sup>2</sup>

---

1 Among those researchers who continue to examine the possibility of a "capital shortage" in the United States, the consensus appears to be that any problem will not be severe so long as the various levels of government succeed, collectively, in being net savers. There also appears to be more concern in the United States regarding the ability of the financial institutions to affect the transfer of funds between deficit and surplus spending units, a concern related in part to the greater number of restrictions -- such as ceilings on time deposit rates -- imposed on the operation of these markets. For a good summary of several recent studies, see Wachtel, Sametz and Shuford (1976).

2 The important issue of the real, after-tax cost of capital to corporations is raised later in the discussions.



In general, the figures contained in the TRACE projections suggest an adequate growth of real investment as measured, for example, by the attendant forecasts of real GNP and the utilization of the capital stock. This does not mean, however, that occasional bottlenecks will not appear, especially in view of likely changes in relative prices and costs of energy use. Further, there is no persuasive reason to believe that the role of the Canadian capital market in transferring funds from surplus to deficit spending units will be any more difficult than in the past. Much of the concern over this issue has been centered in the United States, where interest ceilings and other restrictions pose greater problems for the usual market-clearing mechanisms.

As noted, the TRACE projections include a rate of inflation which -- although considerably lower than the rate of previous years -- is still high by historical standards. Inflation as measured by the implicit GNP deflator is expected to settle at an annual rate slightly in excess of four percent in the late 1980s. The continued impact of high inflation on the cost of capital and on corporate balance sheets thus merits comment. Empirical evidence (Carr, Pesando and Smith (1976)) indicates that nominal interest rates rise on average by an amount equal to the increase in the expected rate of inflation. The real, after-tax return to investors -- and hence the real, after-tax cost to borrowers -- thus declines in response to a joint increase in the actual and expected rates of inflation.<sup>3</sup> The TRACE pro-

---

3 If real and nominal interest rates are equal to 3 percent when the actual and expected rate of inflation is zero, the real after-tax return/cost is 1.5 percent for investors/borrowers in the 50 percent tax bracket. If



jections thus continue to imply a low cost of debt capital to corporations on a real, after-tax basis. Corporations do suffer, on the other hand, by the greater uncertainty which accompanies a more inflationary climate. This uncertainty is reflected in the trend during the recent period of inflation for a disproportionate share of corporate borrowing to occur at the short-end of the market (Pesando (1976)). This behaviour, which reflects the risk-averse behaviour of both corporate borrowers and potential investors, has contributed to what many observers feel is a deterioration in corporate balance sheets. Similarly, the poor performance of the stock market in recent years, combined with the growing evidence that inflation and the real return on common stocks are negatively related (Pesando (1976), Jaffe and Mandelker (1976), Bodie (1976), Nelson (1976)), has contributed to an environment in which the task of raising new equity capital is exceedingly difficult. With the gradual decline in the rate of inflation projected for the forecast horizon, the performance of equity markets should improve and thus this task should be facilitated. On balance, the recent period of inflation may have rendered more difficult the problem of financing real investment in terms of balance sheet deterioration (more short-term debt, less long-term debt and equity) and cash flow problems associated with the tax treatment of depreciation and inventory profits. Offsetting these effects, at least in part, has been the low -- and often negative -- real,

---

the nominal rate rises to 6 percent in response to a 3 percent increase in the actual and expected rate of inflation, the after-tax nominal return/cost is 3 percent and the real after-tax return/cost falls to zero.

after-tax cost of borrowed funds. To the extent that the projected reduction in the rate of inflation in Canada does materialize, the net impact of these forces should be reduced. As noted, corporate saving is expected to finance a large - by historical standards - fraction of the volume of business fixed investment projected for the next decade.

#### 4.3 THE ROLE OF PROVINCIAL FINANCING

The revenue, expenditure and finance decisions of the Province of Ontario are likely to be interdependent. In particular, the financing requirements cannot be treated simply as a residual from earlier revenue and expenditure decisions. Revenue and expenditure models for the Province are presented and discussed later in this report. Any attempt to develop an econometric model of the financing decision is, unfortunately, destined to meet with limited success. If the financing requirements implicit in initial revenue and expenditure projections are deemed to be excessive, discretionary tax and/or expenditure changes are likely to be made -- perhaps through an iterative process - until the implied cash requirements fall within acceptable bounds. Ontario's 1976 Budget<sup>4</sup> provides an excellent example of the manner in which the financing implications of initial revenue and expenditure patterns can lead to adjustment of both the revenue and expenditure components. For all intents and purposes, however, this process

---

4 See in particular, "Budget Paper C: Restraining Expenditure" in Ontario, Budget (1976).

is impossible to quantify and thus does not lend itself to econometric investigation. At the same time, however, the interdependent nature of the revenue, expenditure and financing decisions as outlined above cannot be ignored. The purpose of this section is to identify and to analyze the major issues surrounding the financing requirements of the Province of Ontario in the years ahead. The ultimate goal is to provide a qualitative input into the revenue and expenditure forecasts which are presented in Chapter Five.

The major issue to materialize pertains to the Province's access to non-public sources of funds. These consist in the main of funds available to Ontario via the Canada Pension Plan, the Teacher's Superannuation Fund and the Municipal Employees Retirement Fund (OMERS). The analysis highlights a key problem facing the Province in years ahead: the decreased availability of funds from non-public sources. The analysis proceeds in three parts. In the first, a brief review of past cash requirements and the method by which they were financed is conducted. In the second, the projections of the future availability of funds from non-public sources are presented and discussed, together with their implications for the tax/expenditure decisions of the Province and the capital expenditure plans of Ontario Hydro. The third section analyzes the impact on both Provincial cash requirements and the capital market generally of possible changes in the funding of the Canada Pension Plan.

#### 4.3.1 Historical Data on Financing Requirements of the Province of Ontario

The summary data on the net financing requirements of the Province of Ontario (Table 4.3) are largely self-explanatory. The large increases in the size of the budgetary deficit in 1975-76 (interim) and 1976-77 (estimate), together with a secular increase in the ratios of net debt to GNP and of net debt to budgetary revenue, are worth noting. Of more significance are the summary figures on the financing of the Province's net cash requirements (Table 4.4). These figures indicate the dominant position of non-public borrowing as the prime means by which the Province of Ontario has met its cash requirements in recent years.

The figures on public borrowing refer to borrowing for provincial purposes per se and in that regard can be somewhat misleading. When Ontario Hydro issues debt in the Canadian or European markets, these issues are guaranteed by the Province and are noted as contingent liabilities in the Government's accounts. In addition, the Province normally borrows in the United States market on behalf of Ontario Hydro, with the net proceeds of each issue being recorded as an increase in provincial debt offset by a loan to Ontario Hydro. Borrowing by Ontario Hydro in world capital markets thus directly affects the Province of Ontario's credit rating and ultimately its ability to raise funds from public sources. The relatively modest amounts raised by the Province for its own purposes thus can be misleading if one does not remember that the majority of the Province's borrowing from public sources is effectively made on behalf of Ontario Hydro. In 1976, to complement the Province's own program of expenditure restraint, the Treasurer



TABLE 4.3

PROVINCE OF ONTARIO CASH REQUIREMENTS, RELATED MEASURES, 1970-76

<u>Year</u>	<u>Budgetary Deficit</u>	<u>Non- Budgetary Deficit</u>	<u>Net Cash Requirements</u>	<u>Net Debt</u>	<u>Net Debt/ GPP (%)</u>	<u>Net Debt/ Budgetary Revenue (%)</u>
1970-71	136	430	566	1529	4.3	30.4
1971-72	625	396	1018	2154	5.6	40.3
1972-73	366	378	744	2522	5.9	41.7
1973-74	379	329	708	2902	5.9	42.4
1974-75	546	431	977	3448	6.0	42.2
1975-76 (Interim)	1570	319	1889	5018	7.8	55.9
1976-77 (Estimate)	977	253	1230	5995	8.1	55.4

Source: Ontario, Budget (1973), Ontario, Budget (1975), and Ontario, Budget (1976)

- Notes: (1) Dollar figures are in \$ millions  
 (2) Net debt increases in each fiscal year by the amount of the budgetary deficit.



TABLE 4.4

SOURCES OF PROVINCIAL FINANCING, 1970-1976

Year	Non-Public					Public	Net Change in Liquid Reserves	Total Financing
	CPP	Teachers	OMERS	Other	Total			
1970-71	476	80	58	- 3.9	610	- 51	7	566
1971-72	498	172	75	1.7	747	286	- 15	1,018
1972-73	536	120	95	29	780	252	- 288	744
1973-74	606	195	126	11	938	- 228	2	708
1974-75	702	286	144	24	1,156	- 305	- 126	977
1975-76 (Interim)	784	197	152	89	1,222	743	76	1,889

Sources: Ontario, Budget (1973), Ontario, Budget (1975), Ontario, Budget (1976)

Notes: (1) All figures are in \$ Millions  
 (2) OMERS refers to Ontario Municipal Employees' Retirement Fund

of Ontario requested parallel measures of restraint from Ontario Hydro.<sup>5</sup> The Province cannot reduce its effective dependence on public markets (and hence maintain or improve its credit standing) without corresponding restraint by Ontario Hydro. The magnitude of the Province's activities in behalf of Ontario Hydro must be emphasized. Gross proceeds for Ontario Hydro from the issue of long-term bonds and notes totalled \$1,624 million in 1975 and \$670 million in 1974. (The corresponding net figures are \$1,418 million and \$506 million, respectively (Ontario Hydro (1975))). All of these bonds and notes are guaranteed as to principal and interest by the Province of Ontario. To the extent that the Province is forced to borrow in public markets for its own purposes, its ability to do so on behalf of Ontario Hydro may be reduced.

#### 4.3.2. Projections of Non-Public Sources of Funds

The Canada Pension Plan, Teacher's Superannuation Fund and Municipal Employees' Retirement Fund (OMERS) constitute the three major non-public sources of funds. The importance of these pension funds as the prime means by which the Province of Ontario has met its cash requirements in recent years has already been emphasized. Through the study of the operations of the respective pension plans, estimates of the likely flow of funds available to the Province in years ahead can be obtained. The Province of Ontario has, for example, developed a Canada Pension Plan Simulation Model

---

5 For the details of this restraint program, see page 12 of "Budget Paper C" in Ontario, Budget (1976).

(PENSIM) which has been used in analyzing a number of pertinent issues relating to the CPP. Using these types of models, the Finance Branch of the Ministry of Treasury, Economics and Intergovernmental Affairs has been able to generate forecasts of the major non-public sources of funds for the period 1976-87.<sup>6</sup> These figures are summarized in Table 4.5.

The projections of the gross sources of borrowings, which (closely) parallel the figures presented in the Provincial budgets, indicate a continual growth in the total funds available from these sources throughout the forecast horizon. The gross flow of funds from each pension plan equals contributions plus interest earned plus repayments of loans less benefits paid and expenses of administration.

The gross borrowing figures are a potentially misleading measure of the availability of funds to the Province, however, because they include the interest paid by the Province on outstanding loans from the respective pension plans. In the case of the CPP, for example, the Province pays interest on its outstanding loans, but then these interest payments are effectively returned to the Province by the formula which governs provincial borrowing from the CPP. The data on net provincial borrowing from these pension plans are strikingly different. Net borrowing equals gross borrowing

---

6 The simulation of the CPP requires key macroeconomic inputs, the most important of which pertain to inflation, wages and interest rates. The forecasts of these variables used in the simulation of CPP are broadly similar to the TRACE projections. The comments of Bob Christie, Bill Milne and John Tysall of the Finance Branch of the Ministry greatly improved both the content and presentation of the ensuing discussion.

TABLE 4.5

MAJOR NON-PUBLIC SOURCES OF FUNDS, 1976-1987

Year	Gross			Net		
	C.P.P.	Teachers & OMERS	Total Pension	C.P.P.	Teachers & OMERS	Total Pension
1976-77	807.3	361.1	1168.4	414.9	148.0	562.9
1977-78	832.8	401.4	1234.2	376.7	148.7	525.4
1978-79	857.8	444.1	1301.9	340.1	147.1	487.2
1979-80	872.2	488.6	1360.8	294.8	142.4	437.2
1980-81	831.0	532.7	1363.7	195.2	131.9	327.1
1981-82	873.5	576.5	1450.0	182.0	116.1	298.1
1982-83	890.0	693.4	1583.4	140.0	93.3	233.3
1983-84	898.0	661.7	1559.7	88.4	62.1	150.5
1984-85	924.6	696.1	1620.7	54.8	20.8	75.0
1985-86	958.9	745.0	1698.9	7.0	- 17.3	- 10.3
1986-87	1226.8	799.4	2006.2	- 107.5	- 65.2	- 172.7

Sources: Finance Management Branch, Ministry of Treasury, Economics and Intergovernmental Affairs, "Non-Public Borrowing", January 1976.

Notes: (1) All figures are in \$ millions  
 (2) Net cash flow equals the gross borrowings less interest and retirement amounts paid by the Province.

less interest and retirement amounts paid by the Province. The projections indicate that the net flow of funds to the Province from these sources will decline steadily throughout the forecast period and actually become negative by 1985-86. Thus the continual growth in the gross flow of funds obscures the fact that this growth reflects, in large part, the reborrowing of interest paid by the Province to the several pension funds. Equivalently, the continual growth in the gross flow of funds is more than offset by an increase in the interest payable on outstanding loans from the CPP and the other pension funds.

Inspection of the table indicates that the net flow from Teachers'-OMERS turns negative in 1985-86, with the CPP following in 1986-87. In fact, the net source of funds represented by these pension plans actually peaked at \$726 million in fiscal 1974-75. Gross borrowing from these sources in 1974-75 equalled \$1,132 million of which \$406 million consisted of interest payments on outstanding loans.

Since non-public sources will provide a reduced net flow of funds to the Province in the period 1977-87, and indeed will become negative by the mid-1980s, net cash requirements of the Province will increasingly have to be met through public borrowing. Since the Province borrows both for itself and for Ontario Hydro, increased Provincial borrowing for its own purposes may constrain the amount of borrowing that the Province can do on behalf of Ontario Hydro. Alternatively, the financing of the large energy investments foreseen for Ontario Hydro may exert greater pressure on the Province to minimize its own cash requirements. Implicit in these comments is the possible existence at any point in time of an approximate ceiling on the amount



that the Province can borrow on its own behalf and on the behalf of Ontario Hydro. Such a ceiling would reflect (1) the Province's desire to maintain its high credit rating,<sup>7</sup> which is necessary to ensure continuous access to Canadian and foreign (especially, the United States) capital markets and (2) the growth in the portfolios, together with any change in their composition, of those institutions which are the major holders of the Province's debt.<sup>8</sup> Although the estimation of the likely magnitude of such a ceiling together with its rate of growth is beyond the scope of this study, two observations are worth noting. First, the projected reduction in the availability of non-public sources of funds increases the likelihood that such a ceiling would become operative, and hence the likelihood that financing considerations would affect Provincial revenue and expenditure decisions and/or the capital and operating budgets of Ontario Hydro together with its rate structure. Second, the maintenance and the growth of direct or guaranteed

---

7 At present, Standard and Poor's gives the Province of Ontario a Double A rating while Moody's gives the Province a Triple A rating. These favourable ratings make the Province's debt issues attractive to a wide range of U.S. financial institutions.

8 A recent survey by Salomon Brothers, for example, indicates that two-thirds of the major financial institutions in the United States have a target proportion and/or ceiling on Canadian debt issues. The issue of whether the Canadian targets or ceilings are broken down on a provincial basis is less clear. The possibility of non-price rationing in the U.S. market remains a major concern of the Province of Ontario. The issue, in large part, centres on the extent to which portfolio targets would be altered in response to relative yield changes, together with the extent to which the yields on the Province's securities could rise without being treated as a de facto reduction in the credit rating of the Province. As noted previously, a high credit rating is deemed necessary to ensure continuous access to the U.S. market.

borrowing by the Province from the high levels of 1975 and 1976 would require the continued access to foreign capital markets, especially the United States.

#### 4.3.3 Issues Involving the Financing of the Canada Pension Plan

As noted previously, if the structure of contributions and benefits of the CPP remains unchanged, the net flow of funds to the Province from this source will turn negative in the mid-1980s. The importance of this development is hard to overemphasize. In fiscal 1974-75, the year in which the net flow from the CPP peaked, this net flow equalled \$421 million or 60 percent of the \$696 million cash requirement of the Province, net of interest payments to the CPP.<sup>9</sup> In addition, the flow of funds to the Province from the CPP has been both stable and predictable, thus facilitating financial management. At present, there are two key uncertainties with regard to the financing of the CPP which could affect the outlook for provincial financing. The first of these concerns the possibility of an increase in contribution rates in the relatively near future; the second, the formula which determines the interest rate which the Province must pay on funds borrowed from the CPP. Both issues are examined below.

CPP contributions from both employees and employers go into a fund whose value at the end of 1974 stood at \$7.9 billion. The CPP is, however,

---

9 The interest payment to the CPP was \$281 million in 1974-75, while the gross borrowing from the CPP was \$702 million and the cash requirement of the Province -- inclusive of CPP interest payments -- was \$977 million.

only partially funded since contributions at current rates are not sufficient to cover future benefits at market rates of return.<sup>10</sup> Under current financing arrangements, the CPP fund is projected to rise through 1990 and then fall to zero by 2001.<sup>11</sup> The CPP fund lends money to the provinces by purchasing provincial securities in proportion to the provinces' contributions. The provinces pay an interest rate equal to the rate on Government of Canada securities with a maturity of 20 years or more, which is less than the rates that the provinces would have to pay on funds borrowed on the open market.

At least until recently,<sup>12</sup> the likelihood appeared strong that contribution rates to the CPP would be increased in the not-too-distant future.

---

10 See Pesando and Rea (1976) and references contained therein for a more complete discussion of these and related issues.

11 The assumptions under which these projections are made may be found in Ontario Ministry of Treasury, Economics and Intergovernmental Affairs (1976e), p.9.

12 The Canada Pension Plan Advisory Committee, in a Report tabled in the House of Commons on November 10, 1976, has recommended that the CPP be transformed from a partially funded to a "pay-as-you-go" plan. If the recommendations of the Advisory Committee are accepted, the contribution rates would remain at their present levels until the net cash flow to the provinces became negative and equal to the interest on the outstanding debt. At that time, the CPP fund would remain constant at a value of approximately \$24 billion. Contribution rates would then be gradually increased so that current contributions together with the interest paid by the Provinces would be sufficient to meet current benefits. The net cash flow to the Provinces would remain negative and equal to the interest on the CPP fund. Thus there would be no relief from the scenario described in the text. In a recent speech, the Treasurer of Ontario (McKeough (1977)) has taken the opposite view, suggesting that the CPP become fully funded and hence that the CPP contribution rates be raised in the near-term. He also argues, however, that the excess CPP funds be invested in the private sector.

As noted, under present financing arrangements the fund would peak in 1990 and be completely exhausted by 2001, at which point contribution rates would have to be raised and/or benefits reduced. As Pesando and Rea (1976) note, moderate increases in CPP contribution rates in the near future would eliminate the need for dramatic increases later on. The impact of higher contribution rates on the outlook for provincial financing is straightforward. Higher contribution rates would mean a larger flow of funds to the provinces from the CPP and a corresponding postponement of the time at which the net flow to the provinces becomes zero. Thus the rather pessimistic conclusions regarding the availability of CPP financing would merit qualification if contribution rates were increased in the relatively near future. Note, however, that higher contribution rates would only postpone -- but not eliminate -- the day in which the Province could no longer rely on the CPP as a net source of new finance.

A related issue is whether higher CPP contribution rates will increase or reduce the aggregate level of private saving in Canada, an issue which has obvious implications for the Canadian capital market. If consumption (and hence saving) depend only on disposable income, then the reduction in disposable income which would accompany higher contribution rates would reduce both private consumption and private saving. If consumption decisions depend on net worth or permanent income, the result is similar. An increase in contribution rates with the benefit package unchanged would represent a reduction in the net worth of the private sector by virtue of a reduction in the intergenerational transfer of wealth associated with the CPP. As a result,



both private consumption and private saving would presumably decrease.<sup>13</sup> If the increase in contribution rates had been anticipated by the public, then private consumption would be unaffected and the entire increase in CPP contributions exactly offset by a reduction in private saving. The impact of higher contribution rates on public saving depends on whether governments respond to the increased availability of CPP funds by increasing their own expenditures. If they do not, public saving would increase. There is no reason to believe, however, that provincial governments have not -- and would not -- respond to the increased availability of funds from the CPP by increasing provincial expenditures.

The second topical issue surrounding the financing of the CPP concerns the rate at which the provinces pay interest on the funds borrowed from the CPP. At present, the provinces pay a rate equal to the yield on long-term Government of Canada bonds. This rate is below the rate the provinces would otherwise be forced to pay because (1) provincial bonds are in a higher risk class and (2) outstanding long-term Canada bonds bear low coupons and thus trade at low yields because of tax considerations. For Ontario, the Advisory Committee of the Canada Pension Plan (Canada, 1975) estimates the interest subsidy to be about 1.12 percentage points. Underwriting costs associated with market issues are likely to make the subsidy somewhat larger than the figure cited by the Advisory Committee. The Advisory Committee has recommended

---

13 The reduction in permanent income or wealth would presumably lead to a reduction in planned consumption in both the pre- and post-retirement years. Hence the amount of private savings which would have to be accumulated to finance consumption in the post-retirement period would be reduced, given the assumption that the benefit package of the CPP is unchanged.



that negotiations be opened with the provinces with regard to the formula to be used in determining the rate to be charged for CPP funds. The Committee recommends, in effect, that the provinces pay interest on these funds at a rate commensurate with the yield they would have to offer on securities sold in the open market.

If the interest rate charged for CPP funds is increased, the near-term effect will be largely confined to increasing the gross amount of borrowing by the Province from the CPP, while leaving the net flow of funds unaffected. Higher interest payments by the Province to the CPP would be accompanied by an increased flow of CPP funds to the Province by the formula which dispenses the excess of CPP revenues over expenses to the provinces. The net figures reported in Table 4.5 would be unchanged, while the gross figures would rise steadily over time relative to those reported in the table. Interest payments on the public debt, a budgetary expenditure item, would also rise in tandem with the increase in gross borrowing from the CPP. The net borrowing from the CPP, or gross borrowing less interest paid on outstanding debt, is the more useful measure of the contribution of the CPP to meeting the Province's financing requirements. There exists, of course, the possibility that a higher interest rate on CPP funds might serve to depress the rate of growth of the Province's expenditure. The tendency for the Province, at least implicitly, to discount the likelihood of repaying this debt would tend to weaken this potential effect.<sup>14</sup> A more important

---

14 The Province (Ontario Ministry of Treasury, Economics and Intergovernmental Affairs (1976<sup>e</sup>), in a recent discussion of issues pertaining to the financing of the CPP, proposes for discussion a pay-as-you-go scheme in which, in effect, the Province would never have to repay outstanding loans from the CPP. For a further discussion of this issue, see Pesando and Rea (1976).

effect might be produced by the increase in budgetary expenditures which, as noted above, would accompany an increase in the rate paid by the Province for borrowed CPP funds. To the extent that the Province is sensitive to the overall rate of growth of its budgetary expenditures, the increase in interest payments might lead to a reduction in other expenditure items.

To summarize, if contribution rates to the CPP were to increase, the result would be to increase the net flow of CPP funds to the Province above the levels reported in Table 4.5. The financial pressure emanating from the reduced availability of non-public funds would thus be postponed. If the interest rate charged to the Province on CPP funds were to increase, there would be no major change in the net flow of CPP funds to the Province. Both the gross borrowings from the CPP and the interest paid on the public debt, however, would rise to reflect the increase.

#### 4.3.4 Overview and Implications

The dramatic reduction in the future availability of non-public sources of funds is clearly the most important development affecting the outlook for the finances of the Province of Ontario in the next decade. As a result, the input of financing considerations into decisions with regard to tax rates and/or expenditures will presumably assume increasing importance in the years ahead. In view of the interdependence of the borrowing requirements of the Province and Ontario Hydro, the potentially constraining impact of financial considerations on the planned capital expenditures of Ontario Hydro must also be noted. This fact is particularly relevant in

view of the large volume of capital expenditures foreseen by many for Ontario Hydro in the next decade. The extent to which financing considerations influence the taxation/expenditure decisions of the Province and/or the capital expenditures of Ontario Hydro will be determined in large part by political factors. To the extent that the availability in the past of CPP and other non-public sources of funds has served as a stimulus to government spending, then their reduced availability may exert a constraining influence in the future.



ONTARIO GOVERNMENT REVENUE AND EXPENDITURE

by

John W.L. Winder

5.1 INTRODUCTION

The projections of revenues and expenditures of the Government of Ontario presented in this chapter are based on the work of Foot (1975b and 1976). Economic research in Canada has generally neglected the junior levels of government even though their combined expenditures now far outweigh those of the federal government. Foot's pioneering analysis of the finances of the largest of these is comprehensive and detailed. Annual revenues and expenditures are assembled into many consistent time series in order to facilitate econometric techniques of analysis. Such assemblage is a monumental task. The needs of the econometrician and the requirements of sound accounting are understandably worlds apart.

The projections of revenues and expenditures presented here, then, are based upon econometric techniques. These techniques have been employed to measure such relationships as that between personal income tax receipts on the one hand and tax rates and tax base on the other. Expenditure series are similarly related to various plausible explanatory variables. The relationships estimated in this way are necessarily 'historical' and,



in a sense, at best descriptive of a particular period of experience. But these estimated relationships are much more sophisticated than merely 'drawing a line through' the time path of a revenue or expenditure series on a graph. The projections based on such relationships are similarly more sophisticated than mere extrapolation of past rates of growth of individual revenue or expenditure series. They lend themselves to sensitivity analysis in response to changes in underlying fundamental determinants in a way that simple extrapolations could never do.

The projections nevertheless remain very conditional. They are conditional upon such things as tax structure not being radically different in the future with respect to features not explicitly accounted for by the relationships. They are conditional upon the projections of underlying determinants, principally tax bases and various measures of income. They are conditional upon assumptions that are made about tax rates, federal-provincial agreements and the like. And finally, for some categories of revenues and expenditures, the projections are essentially exogenous. That is to say, they are based on judgment or convenient assumption rather than econometric estimation, or the latter technique may be used in a purely descriptive way. The approach followed is indicated as the categories are discussed in turn.

## 5.2 THE REVENUE CATEGORIES

Table 5.1 presents actual Ontario Government Revenues for the fiscal year 1975/76, related as closely as possible to the categories to be projected. Provincial Statements show non-budgetary revenue separately as

TABLE 5.1

## ACTUAL ONTARIO GOVERNMENT REVENUES 1975/76

	(\$ millions)	Percentage of Total Revenue
Personal Income Tax	1571	16.3
Corporation Income Tax <sup>1</sup>	980	10.1
Retail Sales Tax	1328	13.7
Motive Fuel Tax	578	6.0
Other Taxation	748	7.7
Total Taxation Revenue	5205	53.9
OHIP Premiums	573	5.9
LCBO Profits	333	3.4
Motor Vehicle Licences & Permits	222	2.3
Other Fees & Licences	105	1.1
Miscellaneous Other Revenue	251	2.6
Total Other Revenue	1484	15.3
Payments from the Federal Government	1930	20.0
Interest on Investment	533	5.5
Total Budgetary Revenue	9152	94.7
Total Non-Budgetary Revenue <sup>2</sup>	510	5.3
Total Revenue	9662	100.0

Source: Ontario, Financial Report (1976).

1 Corporation Taxes in total were \$1140 million or 11.8% of total revenue.

2 Excludes Ontario Hydro Receipts secured by bonds.

Receipts and Credits and consequently report revenue categories as percentages of budgetary revenue. It is of course total revenue that is relevant for determining cash requirements.<sup>1</sup>

Appendix A5.1 describes the econometric equations employed in the projections for all these revenue categories. The four main taxation revenues (personal income, corporate income, motive fuel and retail sales) are based on a 'rate-base' model. That is to say the revenues are explained by applying a tax rate to a tax base. The miscellaneous taxation revenue category, however, is represented in a way which is essentially historically descriptive, in terms of its relationship over the sample period to population and gross provincial product. Foot (1976) has no such equation for this residual although he does have rate-base equations for some components.

In summary, based on 1975/76 data, about 85% of taxation revenue is represented by structural or rate-base econometric relationships in this study.

Although the rate-base model cannot be applied directly to the other revenue categories, an essentially structural basis does underlie all but

---

1 Ontario, Finances (1976) reports Revenues for 1975/76 to be \$9,520 million. This differs from the total in Table 5.1 by \$142 million, as the result of exclusion of interest received from Ontario Hydro from Interest on Investments. Since there is an offsetting expenditure entry, there is no impact on net cash requirements as long as both are included, or excluded. Excluded from the published total as well as the total in Table 5.1 is \$46 million of repayments of Ontario Hydro loans from Receipts. The intention of the exclusion is that net cash requirements for the Province shall not reflect transactions on behalf of Ontario Hydro. Ontario, Budget (1975) discusses this change in presentation. See footnote 2.

the miscellaneous category, which is to say all but 17% of other revenue. The equation for the miscellaneous category is again historically descriptive rather than analytic, relating miscellaneous other revenue to gross provincial product.

Payments from the federal government, interest on investment and non-budgetary revenue are also projected from historically descriptive rather than analytic relationships. Each of the latter two is related to gross provincial product and provincial population. Payments from the federal government are related to total taxation revenue and total other revenue.

In summary about 59 per cent of total revenue (based on data for the 1975/76 fiscal year) can be based on the structural relationships presented in Foot (1976). The rest must either be projected on the basis of judgment or historical pattern. The approach taken here is to use the historical pattern at least as a valuable benchmark in relation to which alternative judgment could be assessed. Even in these cases, however, historic growth paths are not simply extrapolated. Changes in the variables to which these categories seem to have been related in the past can alter the paths they are projected to follow in the future.

### 5.3 THE EXPENDITURE CATEGORIES

Table 5.2 presents actual Ontario Government Expenditures for the fiscal year 1975/76, related as closely as possible to the categories to be projected. Provincial statements show non-budgetary expenditures

TABLE 5.2

## ACTUAL ONTARIO GOVERNMENT EXPENDITURES 1975/76

	(\$ millions)	Percentage of Total Expenditure
Health	2987	26.0
Education <sup>1</sup>	2795	24.4
Treasury, Economics and Intergovernmental Affairs <sup>2</sup>	423	3.7
Transportation and Communications	964	8.4
Community and Social Services	881	7.7
Public Debt - Interest <sup>2</sup>	867	7.6
All Other Budgetary and Non- Budgetary Expenditures <sup>2</sup>	2544	22.2
Total Expenditures	11461	100.0

Source: Ontario, Financial Report (1976).

---

1 Includes Colleges and Universities.

2 Basis of reporting evidently diverges substantially from the basis of allocation adopted in Foot (1976). See text.



separately as Disbursements and Charges. It is of course total expenditure that is relevant for determining cash requirements.<sup>2</sup>

Appendix A5.2 describes the econometric equations employed in the projections for these expenditure categories. Whereas for revenues there is typically one equation per tabulated revenue category, in the case of expenditures there are generally several equations underlying any one tabulated category. Individual equations relate to a functionally distinct role within a Ministry, such as administration.

This functional approach is the unique feature in Foot (1976) and the assemblage of series on this basis constitutes the monumental task referred to earlier. One inconsequential by-product of it is, however, that there is no easy basis of reconciliation with published data. For this reason, for example, Table 5.2 fails to distinguish between budgetary and non-budgetary expenditures. The essential reason is that Foot (1976) assigns to Treasury, Economics and Intergovernmental Affairs (TEIGA) a functional role beyond that reflected in the tabulated figure for that Ministry. In the projections a partial reconciliation is achieved by equating TEIGA debt transactions to interest on the public debt and allowing

---

2 Ontario, Finances (1976) reports Expenditures for 1975/76 to be \$11,319 million. This differs from the total in Table 5.2 by \$142 million, as the result of exclusion of interest paid to Ontario Hydro from Interest on the Public Debt. Since there is an offsetting revenue entry, there is no impact on net cash requirements as long as both are included, or excluded. Excluded from the published total as well as the total in Table 5.2 is \$575 million of secured advances to Ontario Hydro from Disbursements. The intention of the exclusion is that net cash requirements for the Province shall not reflect transactions on behalf of Ontario Hydro. Ontario, Budget (1975) discusses this change in presentation. See footnote 1.

TEIGA development loans to be subsumed in the residual category.

The equations employed, following Foot (1976) for the most part reflect the view that the provision of public goods and services in Ontario is extended in response to perceived demand which is founded primarily on a complementary relationship with the demand for private goods and services, rising as increases in disposable income come to be accepted as more than transitory. This preliminary specification is modified in some cases to allow for additional or over-riding factors such as the progress of urbanization, the availability of federal funds or the imminence of an election.

The reconciliation difficulties also complicate the problem of explaining the percentage distribution of structural rather than non-structural approaches to the expenditure projections. The residual category (All Other Budgetary and Non-Budgetary Expenditures) represents \$2222 million in 1975/76 by the classification employed here, which is 19.4 per cent of total expenditures. The other \$322 million is assigned to TEIGA.<sup>3</sup> Structural equations account for the rest, except for health insurance payments to practitioners for which the data series is too short to permit such estimation. They are therefore projected at current real per capita levels. These payments now represent about 25 per cent of health expenditures or about 6.8 per cent of total expenditures. The overall percentage of total expenditures projected by judgment rather than on the basis of

---

3 That is to say, Table 5.6 to follow shows 1975/76 'All Other Budgetary and Non-Budgetary' expenditures to be \$322 million less than reported in Table 5.2. In Table 5.6 TEIGA expenditures are greater than in Table 5.2 by this same amount.

econometric equations is therefore about 25 per cent, based on values for 1975/76.

#### 5.4 ECONOMIC BACKGROUND FOR THE PROJECTIONS

Income variables play a key role in the projections of Ontario government revenues and expenditures. Taxation revenue categories are related explicitly to the application of specific tax rates to a tax base. The tax base is of course closely related to personal income in the case of the personal income tax. Corporate income taxes are related to corporate profits, retail sales taxes to retail sales and motive fuel taxes to sales of gasoline and diesel fuel. Revenue categories which did not lend themselves to such modelling have been estimated in relation to gross provincial product. Similarly, most expenditure categories are related to personal disposable income, with the residual category tied to gross provincial product.

Directly or indirectly, then, the projections of Ontario Government revenues and expenditures depend heavily upon the projections of gross provincial product, provincial personal income and provincial personal disposable income, each of which in turn depends upon the projection of its national counterpart.

Before turning to the projections of the revenues and expenditures themselves, therefore, it is advisable to set the economic stage by an examination of the projections for these key income variables. Projected average annual percentage rates of growth for these income variables are presented in Table 5.3 for the two-year period 1975 to 1977 and for the

TABLE 5.3

GROWTH RATES OF KEY INCOME PROJECTIONS  
(Average Annual Percentage Growth)

<u>Current Dollars</u>	<u>1975-77</u>	<u>1977-82</u>	<u>1982-87</u>
Personal Income:			
Ontario	11.4	9.0	8.2
National	11.1	8.7	8.0
Personal Disposable Income:			
Ontario	10.9	8.8	7.9
National	10.8	8.6	7.8
Gross Product (at market prices):			
Ontario	13.4	10.2	8.7
National	12.9	9.9	8.5

---

Source: Table 2.13 and equations in section A5.3.

subsequent two five-year periods 1977 to 1982 and 1982 to 1987.

In all cases, the provincial income variable is projected to grow at about the same rate as its national counterpart. The reason is that each of the provincial income variables is determined by an estimated equation relating it to the corresponding national variable. This procedure reflects the lack of a model of the Ontario economy which would generate such variables directly.<sup>4</sup>

The fact that the projected growth rates for provincial income variables tend to exceed slightly the corresponding growth rates for the national variables seems to reflect the fact that Ontario has been a relatively fast growing sector of the national economy. Whether because of higher real energy costs or whatever reason, this dynamism appears to have diminished over the last few years: provincial income variables have declined somewhat in relation to their national equivalents.

In the present context, it was necessary to introduce adjustments to compensate for the tendency of the estimating equations to overpredict actual values for 1975. These adjustments were extended throughout the projection period. The fact that the growth rates for provincial income variables in Table 5.3, which are net of these adjustments, remain as high as they do in relation to the growth rates for national variables suggests that the adjustments which have been made are perhaps insufficient.

These are the income growth rates underlying the revenue and expenditure projections in the following two sections.

---

4 See the comments on the Haronitis (1971) model in Section 1.2.



TABLE 5.4  
ONTARIO GOVERNMENT REVENUES  
(MILLIONS OF CURRENT DOLLARS)

	1975	1976	1977	1978	1979	1980	1981
PERSONAL INCOME TAX	1571.	1707.	1843.	2022.	2183.	2335.	2506.
CORPORATION INCOME TAX	980.	1135.	1234.	1384.	1542.	1684.	1878.
RETAIL SALES TAXES	1328.	2022.	2262.	2530.	2794.	3052.	3330.
MOTIVE FUEL TAX	578.	599.	730.	666.	694.	724.	758.
OTHER TAXATION	749.	895.	1016.	1147.	1289.	1431.	1588.
	-----	-----	-----	-----	-----	-----	-----
TOTAL TAXATION REVENUE	5206.	6357.	7085.	7750.	8502.	9227.	10062.
	-----	-----	-----	-----	-----	-----	-----
OHIP PREMIUMS	573.	790.	807.	820.	839.	859.	882.
LCRO PROFITS	333.	369.	402.	438.	476.	512.	552.
VEHICLE REGISTRATION FEES	222.	230.	243.	254.	264.	275.	288.
OTHER FEES AND LICENCES	105.	116.	127.	139.	150.	162.	174.
MISCELLANEOUS OTHER REVENUE	251.	295.	333.	373.	417.	460.	508.
	-----	-----	-----	-----	-----	-----	-----
TOTAL OTHER REVENUE	1483.	1800.	1911.	2024.	2146.	2268.	2404.
	-----	-----	-----	-----	-----	-----	-----
PAYMENTS FROM FEDERAL GOVERNMENT	1930.	2308.	2499.	2680.	2881.	3078.	3302.
INTEREST ON INVESTMENTS	534.	622.	696.	777.	863.	950.	1045.
	-----	-----	-----	-----	-----	-----	-----
TOTAL BUDGETARY REVENUE	9152.	11087.	12192.	13230.	14393.	15523.	16813.
	-----	-----	-----	-----	-----	-----	-----
TOTAL NON-BUDGETARY REVENUE	512.	677.	814.	963.	1123.	1285.	1462.
	-----	-----	-----	-----	-----	-----	-----
TOTAL REVENUE	9664.	11764.	13006.	14193.	15516.	16808.	18275.

TABLE 5.4 (CONT.)  
ONTARIO GOVERNMENT REVENUES  
(MILLIONS OF CURRENT DOLLARS)

	1982	1983	1984	1985	1986	1987
PERSONAL INCOME TAX	2703.	2915.	3143.	3376.	3592.	3821.
CORPORATION INCOME TAX	2110.	2290.	2541.	2680.	2733.	2946.
RETAIL SALES TAXES	3645.	3980.	4354.	4741.	5111.	5509.
MOTIVE FUEL TAX	929.	836.	878.	916.	949.	1158.
OTHER TAXATION	1766.	1951.	2169.	2373.	2562.	2799.
	-----	-----	-----	-----	-----	-----
TOTAL TAXATION REVENUE	11153.	11973.	13085.	14086.	14947.	16233.
	-----	-----	-----	-----	-----	-----
OHIP PREMIUMS	908.	930.	954.	972.	984.	1000.
LCBO PROFITS	598.	646.	699.	754.	806.	861.
VEHICLE REGISTRATION FEES	303.	316.	331.	345.	357.	372.
OTHER FEES AND LICENCES	188.	203.	219.	236.	253.	270.
MISCELLANEOUS OTHER REVENUE	562.	617.	682.	743.	799.	869.
	-----	-----	-----	-----	-----	-----
TOTAL OTHER REVENUE	2558.	2712.	2886.	3051.	3199.	3373.
	-----	-----	-----	-----	-----	-----
PAYMENTS FROM FEDERAL GOVERNMENT	3582.	3813.	4107.	4377.	4612.	4939.
INTEREST ON INVESTMENTS	1151.	1262.	1391.	1513.	1625.	1765.
	-----	-----	-----	-----	-----	-----
TOTAL BUDGETARY REVENUE	18444.	19760.	21469.	23026.	24384.	26310.
	-----	-----	-----	-----	-----	-----
TOTAL NON-BUDGETARY REVENUE	1663.	1872.	2118.	2348.	2561.	2829.
	-----	-----	-----	-----	-----	-----
TOTAL REVENUE	20107.	21633.	23586.	25374.	26945.	29139.

## 5.5 THE REVENUE PROJECTIONS

Projections of Ontario Government revenues to fiscal year 1987/88 are presented in Table 5.4 which is in the same format as Table 5.1. Values for fiscal year 1975/76 have been adjusted to correspond closely with the actual values reported in Table 5.1. These additive adjustments affected only the distribution of revenues among categories. Total revenue in the 1975/76 model solution was essentially correct without adjustment. The adjustments to individual categories have been extended throughout the projection period in the form of a constant amount added or subtracted. Wherever tax rates are included explicitly in the equations underlying the projections, the assumption is that rates are constant at 1975 levels throughout the projection period.

Projected average annual percentage rates of growth for the various revenue categories are presented in Table 5.5 for the two-year period 1975 to 1977 and the two consecutive five-year periods 1977 to 1982 and 1982 to 1987. These growth rates have been calculated from the projections in Table 5.4 for periods corresponding to those for which projected average annual percentage rates of growth of income variables are presented in Table 5.3.

The decline in projected income growth rates over the successive time periods is reflected in all revenue categories. The projected rate of growth of total budgetary revenue exceeds the growth rates projected for all income variables until 1977 but falls below them all subsequently. It is therefore appropriate to consider the first two years of the

TABLE 5.5

GROWTH RATES OF REVENUE PROJECTIONS  
(Average annual percentage growth)

<u>Current Dollars</u>	<u>1975-77</u>	<u>1977-82</u>	<u>1982-87</u>
Personal Income Tax	8.3	8.0	7.2
Corporation Income Tax	12.2	11.3	6.9
Retail Sales Taxes	30.5	10.0	8.6
Motive Fuel Tax	12.4	4.9	4.5
Other Taxation	16.4	11.7	9.6
Total Taxation Revenue	16.7	9.5	7.8
OHIP Premiums	18.7	2.4	1.9
LCBO Profits	9.9	8.3	7.5
Vehicle Registration Fees	4.6	4.5	4.2
Other Fees & Licences	10.0	8.2	7.5
Miscellaneous Other Revenue	15.2	11.0	9.1
Total Other Revenue	13.5	6.0	5.7
Payments from Federal Government	13.8	7.5	6.6
Interest on Investments	14.2	10.6	8.9
Total Budgetary Revenue	15.4	8.6	7.4
Total Non-Budgetary Revenue	26.1	15.4	11.2
Total Revenue	16.0	9.1	7.7

---

Source: Table 5.4.

projection period separately from the final decade.

To some extent the high growth rates of the first two years are a consequence of the adjustment procedure. That is to say, for a revenue category which was overpredicted in the initial solution, subtraction of a constant adjustment term from all years, which leaves year-to-year changes unchanged, results in higher growth rates because of the lower base in relation to which subsequent increases are measured. For example, the adjustment to non-budgetary revenue raised the average annual 1975 to 1977 growth to 26 per cent from 20 per cent, one of the more dramatic instances of this effect. But the growth rate would have been high in any case, primarily in response to the projected rate of increase in gross provincial product.

On the other hand, the high initial growth rates for sales taxes and OHIP premiums are due to other factors. In the latter case, the premium rate was increased from \$11.00 in 1975 to \$15.00 in 1976, an increase of 36 per cent, constituting the entire explanation for the highly disparate projected growth rates in this category. Rates for the final decade are in line with the projected rates of growth of employment. In the case of retail sales taxes, the initially high rate of growth is a consequence of the temporary general rate reduction and suspension of tax on automobile sales during 1975. The government estimated the revenue loss at \$500 million for the fiscal year 1975/76.<sup>5</sup> Adjustment of the weighted-average

---

5 Ontario, Financial Report (1976).



tax rate in the equation employed here for taxes accounted only for about two-thirds of that revenue loss. In part, this was because the weighted-average failed to reflect the elimination of the tax on automobiles. In addition, it failed to take account of the acceleration effect whereby purchases were made prior to the December 31, 1975 termination date of the reduction and exemption. In summary, retail sales tax revenue shows a dramatic initial increase because of a 52 per cent rise in 1976 receipts over those of the previous year as a result of the special provisions in effect in 1975. The increase projected for 1977 over 1976 is only 12 per cent, not far out of line with income growth.

The only other initial projected growth rate sufficiently out of apparent line to merit comment is the low-side figure for vehicle registration fees. The fee per registration is assumed constant so fees are essentially proportional to motor vehicle registrations. These, in turn, are related to real personal disposable income so the adjustment for inflation diminishes the growth rate considerably.

Turning to growth rates for the final decade of the projection period, it is convenient to first follow through on those revenue categories already discussed for the short run. Non-budgetary revenue continues to grow at above average rates but is not sufficiently important as a revenue source to substantially influence the rate of growth of total revenue. Retail sales tax revenues grow at rates between those projected for personal income and gross provincial product, somewhat in excess of projected rates of growth for personal disposable income to which retail sales have been

linked. OHIP premiums grow in pace with provincial employment. Vehicle registration fees continue to follow the growth rate in real disposable income, approximately equal for each period to the tabulated growth rates for personal disposable income less the growth rates for prices of consumer expenditures of 5.6, 4.3 and 3.7 for each of the three successive intervals, respectively.

Motive fuel tax revenues grow at essentially the same rates for the last decade of the projection period as do vehicle registration fees and for the same reason. In the sequence of estimating equations, these revenues are related directly to sales of gasoline and diesel fuel each of which in turn is related to motor vehicle registrations. The latter, as pointed out above, are linked to real personal disposable income so that growth rates in this variable set the pace at the top of the chain for motive fuel tax revenues.

With only one exception all revenue categories not already discussed grow over the last decade of the projection period at rates which are closely aligned to the growth rates projected for the determining income variables. The one exception is, however, a significant case, that of the personal income tax. Personal income tax revenues are projected at rates of growth which fall short of the projected rates of growth in personal income by an average annual rate of about 1.1 per cent. The margin is greater for the initial two years because of the distortionary effect of the adjustment procedure on the growth rate for personal income. The shortfall reflects the joint effect of two factors. The first is indexation of

the tax-rate and exemption-level structure for inflation which, in principle, is designed merely to prevent the progressivity in the personal income tax rate structure from generating inordinately large increases in real tax burdens as an automatic consequence of inflation. The base for the Ontario personal income tax grows essentially in pace with personal income in the province. The relative slow-down in yields is directly attributable to indexation of the national rate schedule and to one other specifically provincial feature: Ontario's tax credit program. This program, which eases the burden of sales taxes and municipal property taxes on the elderly and families with modest incomes is charged to the personal income tax system. The program cost increased by \$85 million to \$391 million for the 1975/76 fiscal year.<sup>6</sup> The program has not been in effect long enough to permit taking proper account of it in terms of econometric estimation of the yield equation employed to generate personal income tax revenues. But the equation does reflect the program to some extent and this is partly responsible for the lower than base-rate growth reported for personal income tax revenues.

## 5.6 THE EXPENDITURE PROJECTIONS

Projections of Ontario Government expenditures to fiscal year 1987/88 are presented in Table 5.6 which is in the same format as Table 5.2. Values for fiscal year 1975/76 have been adjusted to correspond closely with

---

6 Ontario, Financial Report (1976).

TABLE 5.6  
ONTARIO GOVERNMENT EXPENDITURES  
(MILLIONS OF CURRENT DOLLARS)

	1975	1976	1977	1978	1979	1980	1981
HEALTH	2987.	3415.	3915.	4403.	4871.	5368.	5906.
EDUCATION	2795.	3239.	3659.	4056.	4406.	4730.	5059.
TREASURY, ECONOMICS AND INTERGOVERNMENTAL AFFAIRS	744.	935.	1141.	1351.	1554.	1763.	1988.
TRANSPORTATION AND COMMUNICATION	963.	1079.	1266.	1381.	1492.	1608.	1825.
COMMUNITY AND SOCIAL SERVICES	882.	961.	1071.	1187.	1286.	1394.	1506.
PUBLIC DEBT- INTEREST	867.	994.	1149.	1294.	1431.	1578.	1738.
ALL OTHER BUDGETARY AND NON-BUDGETARY	2221.	2565.	2857.	3171.	3508.	3847.	4218.
TOTAL EXPENDITURES	11459.	13188.	15058.	16842.	18547.	20289.	22240.
NET CASH REQUIREMENTS	1795.	1425.	2052.	2649.	3031.	3480.	3965.
GROSS PROVINCIAL PRODUCT (\$ BILLIONS)	63.97	73.88	82.28	91.33	101.04	110.81	121.48

TABLE 5.6 (CONT.)  
ONTARIO GOVERNMENT EXPENDITURES  
(MILLIONS OF CURRENT DOLLARS)

	1982	1983	1984	1985	1986	1987
HEALTH	6529.	7237.	8031.	8901.	9820.	10823.
EDUCATION	5425.	5848.	6293.	6799.	7313.	7846.
TREASURY, ECONOMICS AND INTERGOVERNMENTAL AFFAIRS	2247.	2547.	2880.	3254.	3655.	4083.
TRANSPORTATION AND COMMUNICATION	1953.	2114.	2291.	2619.	2829.	3049.
COMMUNITY AND SOCIAL SERVICES	1634.	1782.	1947.	2134.	2340.	2561.
PUBLIC DEBT- INTEREST	1927.	2137.	2375.	2633.	2902.	3202.
ALL OTHER BUDGETARY AND NON-BUDGETARY	4632.	5064.	5564.	6035.	6473.	7014.
	-----	-----	-----	-----	-----	-----
TOTAL EXPENDITURES	24347.	26729.	29382.	32375.	35333.	38579.
NET CASH REQUIREMENTS	4240.	5096.	5795.	7002.	8388.	9440.
GROSS PROVINCIAL PRODUCT (\$ BILLIONS)	133.43	145.85	160.24	173.82	186.45	202.03



the actual values reported in Table 5.2. These additive adjustments affected only the distribution of expenditures among categories. Total expenditure in the 1975/76 model solution was essentially correct without adjustment.

Contrary to the procedure followed in the case of revenue categories, such adjustments have not generally been extended throughout the projection period. The reason is essentially a technical one growing out of the particular form of the estimation equation typically used in projection of expenditure categories. For the most part, these equations imply a lagged response of the expenditure level to the determining variables, primarily income. Wherever this is not the case, the adjustment factors are carried through the entire production period in the manner discussed above for revenue adjustments.

To carry such an adjustment throughout the projection period in the case of equations implying a lagged response of the expenditure level to the determining variables would be to build in a multiplier effect which would substantially distort all subsequent growth rates and could also radically alter the final mix as well as level of total expenditure. This would clearly be unwarranted. An intermediate procedure sometimes adopted in these cases is to introduce a diminishing sequence of adjustments so designed as to bring about a constant adjustment up or down in the level of the projected series, in other words to result in essentially what was done when adjusting the revenue series. This procedure is not only cumbersome but also of dubious value. When completed the result would be

characterized by the short-run growth-rate distortions due to adjustments discussed above in the case of revenues. Either way, growth rates for the last decade of the projection period are little affected (which is preferable to what would happen if constant adjustments were carried throughout and their impacts allowed to have full magnified effects).

Projected average annual percentage rates of growth for the various expenditure categories are presented in Table 5.7 for the two-year period 1975 to 1977 and the two consecutive five-year periods 1977 to 1982 and 1982 to 1987. These growth rates have been calculated from the projections in Table 5-6 for periods corresponding to those for which projected average annual percentage rates of growth are presented for income variables in Table 5.3 and for revenue categories in Table 5.5.

The decline in projected income growth rates over the successive time periods is reflected in virtually all expenditure fields. The residual category 'All Other Budgetary and Non-Budgetary Expenditure' is tied directly to gross provincial product at the 1975 ratio so all growth rates are equal for these two variables. Public debt interest is also related only to gross provincial product. But instead of an arbitrarily imposed constant ratio, the relationship has been estimated econometrically and the implication is that interest payments on the public debt rise faster than gross provincial product.

The basic pace setter in most other cases is the rate of growth of personal disposable income. Correspondence between growth rates for this primary impetus and expenditure field is closest for Community and

TABLE 5.7

GROWTH RATES OF EXPENDITURE PROJECTIONS  
(Average Annual Percentage Growth)

<u>Current Dollars</u>	<u>1975-77</u>	<u>1977-82</u>	<u>1982-87</u>
Health	14.5	10.8	10.6
Education	14.4	8.2	7.6
Treasury, Economics and Intergovernmental Affairs	23.8	14.5	12.7
Transportation and Communications	14.6	9.1	9.3
Community & Social Services	10.2	8.8	9.4
Public Debt Interest	15.1	10.9	10.7
All Other Budgetary and Non-Budgetary	13.4	10.2	8.7
Total Expenditures	14.6	10.1	9.6

---

Source: Table 5.6.

Social services, where the rates are virtually identical for the first seven years of the projection period. Health expenditures grow somewhat more rapidly throughout because of a higher estimated responsiveness to changes in income. Education expenditures begin at about as high a growth rate as health expenditures but for the last decade of the projection period are essentially in line with rates of growth for personal disposable income. Transportation and Communication expenditures are not far out of line with gross provincial product so far as growth rates are concerned even though the only category to be related to an income variable is administration. Election years (assumed to be every four years on the average) play a key role in highway construction and maintenance equations. The high initial growth rates in the projections reflect the prediction that 1977 will be an election year in the province of Ontario.

Projected growth rates for Treasury, Economics and Intergovernmental Affairs (TEIGA) are obviously high in relation to anything else. It was pointed out earlier that Foot (1976) assigned to TEIGA roles which are allocated otherwise in current Provincial statements of expenditures. But two of his categories have been removed from figures reported here. Debt transactions are equated here to public debt interest and have been discussed already. Development loans have been subsumed within the residual. In any event, starting from a higher base could not account for a higher growth rate. The remaining categories assigned to TEIGA by Foot are

administration, pension funds and tax diminution.<sup>7</sup> Explanatory equations for all of these are formulated as lagged responses to personal disposable income. Examination of these sub-categories reveals that growth rates for each are virtually identical over all reported intervals. The dominance of tax diminution is therefore of no consequence in the reported growth rates for TEIGA, except for the initial two-year period.

## 5.7 IMPLICATIONS FOR NET CASH REQUIREMENTS

Net cash requirements amount to the excess of total (budgetary and non-budgetary) expenditures over total (budgetary and non-budgetary) revenues. As projected here (and consistent with current Provincial reporting practice) net cash requirements are for purely Provincial financial purposes. More specifically, borrowing on behalf of Ontario Hydro is excluded.

As a matter of arithmetic alone, net cash requirements will of course grow even when total revenues and total expenditures grow at some common rate. The average rate of growth of revenues and expenditures over the first half of the last decade of the projection period is 9.6 per cent; over the last half it is 8.7 per cent. If revenues and expenditures in fact were to grow equally at these average rates then net cash requirements would also grow at these rates. The fact that the rate of growth of expenditures

---

<sup>7</sup> Pension fund expenditures are recorded in the Public Accounts under two ministries. The TEIGA finance program lists such charges as the Ontario municipal employees' retirement fund. Under the Ministry of Government Services are found payments such as those to the Canada Pension Plan. The tax diminution category consists of payments arising out of specific Acts such as the Municipal Tax Assistance Act.



is projected to exceed that of revenues by 1.0 per cent for the first half of the decade and by about 2.0 per cent for the last half is reflected in projected growth rates for net cash requirements of 15.6 per cent and 17.3 per cent for the first and second halves of the decade. The minimal requirement for putting these in perspective is to view them in relation to the average rates of growth of revenues and expenditures presented above.

Even when viewed in perspective the implications for net cash requirements are impressive. The projections show a doubling from 16 to 32 per cent of total revenues over the last decade to 1987. As a share of total expenditures the growth from 13.7 per cent to 24.6 per cent is only slightly less dramatic. It is therefore prudent to probe the plausibility of this implication of the projections.

The fundamental approach to such an appraisal has to take the form of an assessment of the revenue and expenditure projections themselves. Strengths and weaknesses inherent in the procedures employed are apparent, explicitly or implicitly, in the description set forth above. It takes the test of measurement against the actual outcome to finally judge such an exercise. Since to wait out the passage of the projection period for such verification would be to forfeit any possible lesson from the projections now, it is clear that some interim judgment is called for. That evaluation, albeit somewhat complicated, must be based on the near-term record. The longer-run experience, after all, once recorded, would surely depart from the projections presented here if only (in the ultimately successful projection scenario) because underlying conditions changed.

The first test of the reliability of the equations used for projections is in relation to actual experience recorded for the fiscal year 1975/76. As reported above, calculated values for total revenues and expenditures were essentially accurate, but there were differences between calculated and actual values among categories. Consequently, as also reported above, adjustment factors to bring the calculations into line with the actual were introduced to provide the base for the projections, and these were carried throughout the projection period as deemed appropriate.

It is in the nature of estimating equations to be less than completely accurate in yielding calculated values, in this case of revenues and expenditures. It follows that adjustments to bring calculated values into line with actual may, in a sense, have 'overcompensated'. Nevertheless, it seems reasonable to compare projected values for fiscal 1976/77 (reflecting as they do adjustments required to bring calculated values for 1975/76 into line) with "revised outlook" values available at the time of writing. This is done for Revenues and Expenditures, respectively, in Tables 5.8 and 5.9.

Projected net cash requirements for fiscal 1976/77 are \$1425 million compared with \$1237 million according to the 'revised outlook', a difference of \$188 million or an apparent overprojection of 15.2 per cent. Projected and 'revised outlook' total revenues and total expenditures cannot be compared directly for lack of the amount of interest revenue collected on behalf of and transmitted through to Ontario Hydro and are excluded from the 'revised outlook' revenue and expenditure totals but implicitly included in

TABLE 5.8  
ONTARIO GOVERNMENT REVENUES<sup>1</sup> 1976/77

	<u>Revised Outlook</u> <sup>2</sup>	<u>Projected</u> <sup>3</sup>
Personal Income Tax	1930	1707
Corporation Income Tax	935	1135
Retail Sales Tax	1860	2022
Motive Fuel Tax	606	599
Other Taxation	1023	895
<hr/> Total Taxation Revenue	<hr/> 6354	<hr/> 6357
OHIP Premiums	790	790
LCBO Profits	325	369
Motor Vehicle Licences & Permits	221	230
Other Fees & Licences	207	116
Miscellaneous Other Revenue	313	295
<hr/> Total Other Revenue	<hr/> 1856	<hr/> 1800
Payments from the Federal Government	2170	2308
Interest on Investment	437	622
<hr/> Total Budgetary Revenue	<hr/> 10817	<hr/> 11087
Total Non-Budgetary Revenue	572	677
<hr/> Total Revenue	<hr/> 11389 <sup>4</sup>	<hr/> 11764

1 Millions of current dollars.

2 Ontario, Finances (1976).

3 Per Table 5.4.

4 Excludes interest received from Ontario Hydro from Interest on Investments. See Footnote 1.

TABLE 5.9  
ONTARIO GOVERNMENT EXPENDITURES<sup>1</sup> 1976/77

	<u>Revised Outlook</u> <sup>2</sup>	<u>Projected</u> <sup>3</sup>
Health	3454	3415
Education	3142	3239
Treasury, Economics and Intergovernmental Affairs	460	935
Transportation and Communications	978	1079
Community and Social Services	970	961
Public Debt - Interest	892 <sup>4</sup>	994
All Other Budgetary and Non- Budgetary Expenditures	<u>2730</u>	<u>2565</u>
Total Expenditures	12626 <sup>4</sup>	13188

---

1 Millions of current dollars.

2 Ontario, Finances (1976).

3 Per Table 5.6.

4 Excludes interest paid to Ontario Hydro from Interest on the Public Debt. See footnote 2.

the projected totals. Whatever this amount, it is apparent there is a net pessimistic bias in the projection values relative to 'revised outlook' values so far as net cash requirements are concerned. For example, assuming Ontario Hydro interest revenue to be \$102 million, the excess of projected public debt interest over the 'revised outlook' value (a somewhat modest assumption given that the value for fiscal 1975/76 was \$142 million), expenditures would appear to be overprojected by 3.6 per cent and total revenues by 2.3 per cent, a net pessimistic bias of almost 1.3 per cent. If this were to be considered endemic to the projections generally, it would be sufficient to more than close the projected gap between growth rates for revenues and expenditures for the first half of the last decade to 1987 and sufficient to substantially reduce it for the last half.

There is, however, great danger in making too much of such short-run discrepancies. Actual expenditures for fiscal 1974/75 exceeded those of the preceding year by almost 25 per cent. During the 1975/76 fiscal year the growth rate was held to about 15 per cent. If the 'revised outlook' values for fiscal 1976/77 prevail, the growth rate of expenditures will have been lowered yet again to about 11.5 per cent. The 'target' rate of increase for 1977/78 has been set at 9.6 per cent.<sup>8</sup>

If realized, this dramatic slowdown in rate of growth of expenditures from about 24 1/2 per cent to about 9 1/2 per cent over a four-year period

---

8 Ontario, Ontario's Economic Strategy for 1977.



would represent a substantial departure from historically evolving trends, whatever else might be said of it. To the extent that such a departure is in the process of being realized it already reflects a determination upon the part of the Government of Ontario to 'exercise restraint' in spending, i.e., to curb the rate of growth of expenditures arising from institutional arrangements entered into in previous years.

There is no way expenditure equations estimated on the basis of historical patterns can be expected to capture such a policy change. The projections based upon such equations must therefore be assessed as the logical outcome of processes that were established over a number of years. Recent policy initiatives to modify these processes can be better understood when considered in the light of the projections which have been presented. These policy changes tend to 'invalidate' the projections; but at the same time they are the best corroborative evidence of how things might otherwise have gone on, as suggested in the projections.

It remains to be seen, of course, whether the policy of restraint is viable in the longer-run, or whether the pressures for expenditure will burst the recently imposed bonds and budgetary realities emerge along the lines projected here.

In any event, it is instructive to ask (apart from questions of short-run projection discrepancies or possibly short-lived policies of constraint) what measures (or combinations thereof) might be employed to ensure that net cash requirements not grow inordinately fast.

For revenues to grow at the rate projected for expenditures, it is

required that revenues be greater by about \$930 million in 1982 and by about \$4200 million in 1987 (i.e., by 4.6 per cent and 14.4 per cent, respectively. If indexing of the personal income tax schedule and the tax credits chargeable to these receipts were to be dropped, increased personal income tax revenues would amount to about 19 per cent and 6 per cent of the overall revenue increases required in each of these years. An increase of two percentage points in Ontario's share of the basic federal tax (from 0.31 to 0.33) would increase personal income tax receipts by about 6 1/2 per cent across the board, a negligible contribution overall. By the same line of reasoning, it would take a radical alteration in retail sales tax rates or rates of corporate income tax to make a significant impact on the projected gap between revenues and expenditures. For example, an increase for 12 to 13 per cent in the rate of corporate income tax would close the gap only by about 6 per cent in 1982 and by less than 1 per cent in 1987. Thus something like an increase from 12 to 15 per cent for the period 1977 to 1982 and to 18 per cent on to 1987 would be required to match the contribution to augmented revenues from abandoning indexing of the personal income tax and credits charged thereto. Even so, less than 40 per cent of the 1982 expenditure-revenue gap would be closed by this combined change (and less than 12 per cent of the 1987 gap). An additional modest increase in the rate of corporate income tax could close the gap to half of what it otherwise would be over the first half of the last decade of the projection period. But for the other half, and indeed for most of the projected gap over the five years up to 1987, relief would

have to be sought in other ways.

Although the increases in tax rates hypothesized alone by no means exhaust the potential for alleviation in this direction (e.g., increasing OHIP premiums to keep receipts at the 1977 level in relation to health expenditures would raise another \$187 million in 1982, \$107 million in 1987), it seems plausible that expenditures may be required to grow less rapidly than projected. Indeed, the Province's current program of restraint could be interpreted as recognition of the fact that increases in rates of taxation cannot reasonably be expected to constitute the sole means of ensuring that expenditures do not appreciably outrun revenues in the years ahead. Expenditures themselves must be restrained.

For expenditures to grow no faster than projected revenues, it is required that expenditures be less by about \$1080 million in 1982 and by about \$4870 million in 1987 (i.e., by 4.4 per cent and 12.6 per cent, respectively). If the government's target rate of increase for fiscal 1977/78 over 1976/77 were to prevail over the period 1977 to 1982, projected expenditures in the latter year would be less by \$552 million, or about half of what would be required to avoid tax increases or relative increases in net cash requirements over the period. Continuation of this growth rate throughout the period to 1982 would reduce expenditures in the latter year by \$956 million, or by about 20 per cent of what would be required (according to values projected here).

In summary, it would appear that continuation of the policy of restraint combined with modest increases in tax rates can hold growth rates

for revenues and expenditures (and therefore for net cash requirements) essentially in line from 1977 to 1982 at, for example, something close to the 9.6 per cent target rate announced for fiscal 1977/78. Beyond 1982 stronger medicine seems to be called for. The calculations cited in this discussion of measures which might be employed to prevent net cash requirements from growing too fast have not been based on simulation results and therefore do not reflect the specified expenditure-impact of changes in personal disposable incomes associated with various revenue or expenditure changes. The specification of most expenditure equations is such that tax increases would imply concomitant expenditure reductions via their reduction of personal disposable income. This effect would not help much except in the case of an increase in the personal income tax.





## Appendix to Chapter Five

### METHODOLOGY OF PROJECTING ONTARIO GOVERNMENT REVENUE AND EXPENDITURE

#### A5.1 ONTARIO REVENUES

##### A5.1.1 Background

Chapter III of Foot (1976) examines the revenue categories in historical perspective. Only the highlights are briefly summarized here.

Taxation revenue is shown to account for over half of total revenue, and budgetary revenue overall for about 95 per cent of that total. The personal and corporate income taxes are two of the most important sources of taxation revenue. Since the war these have been established in the context of a series of five-year fiscal arrangements between the provinces and the Federal government.

These began with tax rental agreements but had effectively evolved into tax sharing by the time of the 1962/63 fiscal year. The Federal government set the base and bore the costs of collection. The provinces could set their own rate schedules more or less in line with the "tax room" allotted to them by the Federal government in the form of abatements. Throughout the period of these arrangements, Ontario has consistently imposed personal income tax rates equal to the amount of the abatement. But the Province has never signed an agreement with respect to the corporate income tax, continuing (with only one rate change) to collect its own since

first instituting the tax in 1957/58.

The six postwar federal-provincial agreements included agreements in such related areas as succession duties, equalisation payments and opting out arrangements, which will not be summarized here. Ontario has never signed an agreement with respect to succession duties, nor received any equalisation payments. It has received numerous conditional grants from the Federal government through certain shared cost programs although participation has not always been voluntary.

The retail sales tax is also a major revenue source, introduced somewhat belatedly in September of 1961. Initial rates were 3 per cent but subsequently 5 per cent and in recent years 7 per cent. Exemptions have changed from time to time. Commissions were discontinued after May 1, 1972 but have now been reintroduced.

Motive fuel taxes have been around for a long time in all provinces, but Ontario was the first to set higher rates for diesel fuel in order to equalise tax paid per mile travelled (inasmuch as diesel engines are relatively more efficient). Purchases for off-highway use are exempt (via refunds).

Ontario also has had specific taxes on tobacco products and on expenditures on amusements and entertainment. Rates on tobacco, based on physical quantity, have consistently increased. Since April of 1969 the amusement tax has been incorporated in the retail sales tax. There are other miscellaneous taxes on specific items which will not be summarized here.

Non-taxation revenue sources amount to about 20 per cent of total gross revenue. Two of the most important of these are health insurance premiums and profits of the Liquor Control Board. Vehicle registration fees come next in importance.

In addition to federal grants from the shared-cost medicare program, Ontario raises funds through monthly health premiums. Hospital insurance began on January 1, 1959. In June, 1966, medical insurance for the financially disadvantaged was introduced. The two plans were combined and extended on October 1, 1969 (and single premiums have been in effect since April 1, 1972), in order to become eligible for shared-cost grants.

The Liquor Control Board has sole authority to licence and control the sale of alcoholic beverages. The mark-up on manufacturers' prices yields a substantial revenue. Beer is sold under Board supervision at retail outlets operated by a non-profit distributing company owned by the Canadian breweries operating in Ontario. Taxes and fees on the distribution and sales by these outlets and fees imposed on licenced premises contribute further revenue.

Motor vehicle registration fees have been around for a long time, and the base for the fee varies for type of vehicle: the number of cylinders for passenger vehicles, gross weight for private commercial vehicles, and a uniform fee for motorcycles. Buses and public vehicles pay various fees. There are also licences to operate a vehicle and miscellaneous fees relating to the dealing, operating and servicing of motor vehicles.

For the sake of completeness only, other revenue sources will be simply listed here.

- fees for the services of various legal officers
- fines and penalties from enforcement of laws and regulations
- angling and commercial fishing licences
- non-resident hunting licences
- deer, moose and gun licences
- royalties from fishing and trapping
- logging tax and stumpage
- ground rent and fire protection charges (forestry)
- acreage taxes on mining lands
- annual rental and royalty payments by mine leaseholders
- quarrying material and beach protection charges
- taxes on natural gas production
- rental payments on water used in electrical generation
- sale and rental of goods and services
- campsite and vehicle permits
- inspection and apprenticeship fees
- tuition fees
- utility service charges

The list of budgetary revenue categories is obviously long. But there remain two important categories to complete it. First, there are payments from federal and municipal governments. The former include everything relating to tax rental agreements and shared-cost programs - all grants, conditional or not. The latter arise mainly in the shared-cost areas of highway construction and law enforcement. Secondly, there is interest revenue, derived from loans to municipalities, interest on assets in the Workmen's Compensation Board and Public Service Superannuation Funds, and interest from liquid assets.

Nonbudgetary revenues (only about 6 per cent of total revenues) are mainly repayments of loans and advances and contributions to the non-trusted Public Service Superannuation Fund, Legislative Retirement



Allowance Fund, the Municipal Employee's Retirement Fund, contributions to the Workmen's Compensation Board, and net savings deposits.

The details of total revenue for the Government of Ontario are summarized in Table A5.1 which also introduces the notation to be used. Wherever possible, this notation is based on that used in TRACE for corresponding national variables. The prefix "O" is used in all cases to distinguish variables in the Ontario databank (OBANK) from other variables in TRACE. To illustrate, OTYP designates the Ontario Tax on Incomes (Y) of Persons; OGREV designates Ontario Government Revue, etc. Table A5.2 sets forth the same information in the accounting-identity form in which they appear in the model.

#### A5.1.2 General Comments on the Empirical Analysis

Chapter III of Foot (1976) was devoted to disaggregating the Ontario government's revenues into a number of relatively consistent revenue categories. For present purposes it seemed inappropriate to retain all the detail contained therein. For the individual categories retained, however, his series were employed, except for data revisions subsequently required for later years, and extended another two years.<sup>1</sup>

---

1 Foot did not use Ontario, Public Accounts as his primary source because the information therein is not classified by revenue source. Canada, Provincial Government Finance, Revenue and Expenditure proved more useful. He set forth three requisite criteria for the revenue categories:

- (a) remain unchanged over time,
- (b) be based on consistent definitions, and
- (c) be reconcilable to Ontario, Public Accounts.

Continued next page.



Chapter V of Foot analyses these revenue categories using econometric

---

Footnote 1 continued from previous page.

He was therefore obliged to undertake a major reconciliation project, involving not only the sources already cited but a companion publication Canada, The Canadian System of Government Financial Management Statistics. Revenues to government enterprises were excluded, but, unlike Ontario, Public Accounts, revenues to agencies and special funds which are merely extensions of ministerial programs or provide services or funds in a manner similar to ministries of the government were included as part of general government revenues. To quote;

<<Consequently, the government universe included in the revenue data consists of:

- (i) Ministries of the government;
- (ii) Administrative, regulatory and special funds which perform functions similar to those of ministries and are organised as boards, commissions or agencies. This includes quasi-trust accounts where the funds are available to the provincial government, social insurance programs, Workmen's Compensation and vacation with pay stamps.
- (iii) Agencies engaged in industrial or commercial activities, primarily aimed at servicing the requirements of the provincial government or primarily for the channelling of funds from one level of government to another or between organisations at the same level of government. This includes, for example, the Ontario Universities Capital Aid Corporation and the Ontario Housing Corporation.
- (iv) Government-owned institutions such as agricultural schools and reform institutions;
- (v) Non-trusted public service superannuation pension plans, which are funds available to the provincial government in financing its operations, and
- (vi) Working capital funds, such as in health & education.>>

techniques. Except for some reduction in detail his equations are re-estimated here for the extended sample period, and with whatever data revisions have occurred.

In the case of taxation revenue categories, a 'rate-base' revenue model was employed, incorporating the application of a tax rate to a tax base. When the objective is to make medium-term projections under alternative assumptions and to analyze the implications of alternative tax policies, it is important to incorporate as much of the tax structure as possible into the model.

Changes in the tax base can occur either automatically in response to the economic cycle or at the discretion of policy makers with regard to inclusions and/or exclusions covered by the tax. Changes in tax rates, of course, always reflect discretionary policy stances. The methodology of the rate-base model is discussed in section 5.2 of Foot (1976).

Besides the annual statements by the Treasurer of Ontario, there are two main data sources for the relevant tax rates: Canada, Principal Taxes and Rates and Canadian Tax Foundation, Provincial and Municipal Finances formerly called Provincial Finances).

Revenues are available on a fiscal year basis. This can be approximated in most cases for the rates but not for the bases. Modifications to the 'rate-base' model called for on this account are discussed in section 5.4 of Foot (1976).

All variables are in current dollars. Foot's sample period ended with fiscal year 1972/73. All equations reported here are based on a

sample period extended to fiscal year 1974/75; together with revisions to data for earlier years as required. All Foot's equations were replicated with revised data for his sample period but are not reported here.

#### A5.1.3 Personal Income Taxes: OTYP

The up-dated estimate of the equation reported in Foot (1976) is the following, where OYP represents Ontario personal income and ORTYP represents Ontario's share of the federal tax. Values in parentheses are standard errors.

$$\text{OTYP} = -5.2 \cdot \text{ORTYP} + 0.124 \cdot \text{ORTYP} \cdot \text{OYP}$$

$$(2.9) \quad (0.010)$$

$$1963-74 \quad \bar{R}^2 = 0.963 \quad \text{SEE} = \$84.0 \text{ mil.}$$

Negative signs are expected for the first term because personal income exceeds the actual tax base to the extent of aggregate exemptions. In the extended sample period, the impact of federal tax reform and/or provincial tax credits is apparent in the last two years, as indicated by the inclusion of a dummy variable D7374 taking on the value one in the years 1973 and 1974 only.

$$\text{OTYP} = -12.5 \cdot \text{ORTYP} + 0.157 \cdot \text{ORTYP} \cdot \text{OYP} - 289.6 \cdot \text{D7374}$$

$$(2.3) \quad (0.009) \quad (62.5)$$

$$1963-74 \quad \bar{R}^2 = 0.988 \quad \text{SEE} = \$48.4 \text{ mil.}$$

When the dependent variable is augmented to include provincial tax credits,

OTYPA, the dummy variable is less significant:

$$\text{OTYPA} = \underset{(2.2)}{-13.5 \cdot \text{ORTYP}} + \underset{(0.085)}{0.161 \cdot \text{ORTYP} \cdot \text{OYP}} - \underset{(58.3)}{67.4 \cdot \text{D7374}}$$

$$1963-74 \quad \bar{R}^2 = 0.992 \quad \text{SEE} = \$45.1 \text{ mil.}$$

In general, we essentially expect Ontario personal income taxes, OTYP, to be a function of the provincial share of tax collections, ORTYP, times the federal rate of tax, times the Ontario personal income tax base. Ontario personal income has been used to proxy the latter. If the weighted average personal tax rate employed in TRACE is used to proxy the federal rate of tax, the result is the following.

$$\text{OTYP} = \underset{(1,413.57)}{-67.41 \cdot \text{ORTYP} \cdot \text{RTYP}} + \underset{(0.046)}{0.498 \cdot \text{ORTYP} \cdot \text{RTYP} \cdot \text{OYP}}$$

$$1963-74 \quad \bar{R}^2 = 0.968 \quad \text{SEE} = \$78.8 \text{ mil.}$$

Although RTYP has been adjusted for inflation in accordance with the provisions for indexing, its inclusion does not improve the results much: the standard error of estimate is lowered from \$84.0 million to \$78.8 million but this substantially exceeds that obtained when RTYP is excluded from the equation and D7374 is included instead (\$48.4 mil.). Augmenting receipts by provincial tax credits increased the standard error of estimate to \$85.6 mil.

$$\text{OTYP} = 495.98 \cdot \text{ORTYP} \cdot \text{RTYP} \cdot \text{OYP} \\ (12.71)$$

$$1963-74 \quad \bar{R}^2 = 0.97 \quad \text{SEE} = \$75.2 \text{ mil.}$$

An alternative approach is to model the Ontario personal income tax along the lines adopted for the federal personal income tax in the TRACE model. In the first instance, this involves a more direct attempt to calculate the tax base, OTAXB, rather than proxy it by inclusion of personal income with a constant term (perhaps interactive with a tax rate) to capture exemption levels. Thus:

$$\text{OTAXB} \equiv \text{OYP} - \text{OSOPP} - (\text{OLE} + \text{OLGM}) \cdot \text{EXL}$$

where:

OTAXB	is	the Ontario personal income tax base
OYP	is	Ontario personal income
OSOPP	is	Ontario contributions to Canada Pension Plan
OLE	is	Ontario civilian employment
OLGM	is	Ontario military employment
EXL	is	the personal income tax exemption level (as defined in TRACE)

Repeating the Foot specification using OTAXB rather than OYP yields the following results:



$$\text{OTYP} = -6.1 \cdot \text{ORTYP} + 0.149 \cdot \text{ORTYP} \cdot \text{OTAXB}$$

(2.4)                      (0.010)

$$1963-74 \quad \bar{R}^2 = 0.975 \quad \text{SEE} = \$68.5 \text{ mil.}$$

$$\text{OTYP} = -11.4 \cdot \text{ORTYP} + 0.178 \cdot \text{ORTYP} \cdot \text{OTAXB} - 217.2 \cdot \text{D7374}$$

(1.9)                      (0.009)                      (50.4)

$$1963-74 \quad \bar{R}^2 = 0.991 \quad \text{SEE} = \$41.2 \text{ mil.}$$

$$\text{OTYPA} = -12.3 \cdot \text{ORTYP} + 0.182 \cdot \text{ORTYP} \cdot \text{OTAXB} + 6.9 \cdot \text{D7374}$$

(1.7)                      (0.008)                      (45.5)

$$1963-74 \quad \bar{R}^2 = 0.995 \quad \text{SEE} = \$37.3 \text{ mil.}$$

$$\text{OTYPA} = -12.5 \cdot \text{ORTYP} + 0.183 \cdot \text{ORTYP} \cdot \text{OTAXB}$$

(1.3)                      (0.005)

$$1963-74 \quad \bar{R}^2 = 0.995 \quad \text{SEE} = \$35.4 \text{ mil.}$$

Replacement of OYP by OTAXB reduces the standard error of estimate substantially. The extent to which OTAXB effectively captures the impact of indexing is reflected in the fact that the dummy variable now loses its significance when tax receipts are augmented by provincial tax credits. However, the coefficient on ORTYP should not be statistically significant if OTAXB adequately reflected exemption levels.

Repeating the expanded specification including RTYP, replacing OYP by OTAXB has the following impact.

$$\text{OTYP} = \frac{-6.6 \cdot \text{ORTYP} \cdot \text{RTYP}}{(10.9)} + \frac{0.610 \cdot \text{ORTYP} \cdot \text{RTYP} \cdot \text{OTAXB}}{(0.041)}$$

$$1963-74 \quad \bar{R}^2 = 0.982 \quad \text{SEE} = \$59.4 \text{ mil.}$$

$$\text{OTYP} = \frac{0.585 \cdot \text{ORTYP} \cdot \text{RTYP} \cdot \text{OTAXB}}{(0.011)}$$

$$1963-74 \quad \bar{R}^2 = 0.983 \quad \text{SEE} = \$57.7 \text{ mil.}$$

$$\text{OTYP} = \frac{-20.6 \cdot \text{ORTYP} \cdot \text{RTYP}}{(13.0)} + \frac{0.682 \cdot \text{ORTYP} \cdot \text{RTYP} \cdot \text{OTAXB}}{(0.058)} - \frac{112.4 \cdot \text{D7374}}{(66.9)}$$

$$1963-74 \quad \bar{R}^2 = 0.984 \quad \text{SEE} = \$54.7 \text{ mil.}$$

$$\text{OTYPA} = \frac{204.9}{(167.2)} - \frac{93.3 \cdot \text{ORTYP} \cdot \text{RTYP}}{(58.1)} + \frac{0.84 \cdot \text{ORTYP} \cdot \text{RTYP} \cdot \text{OTAXB}}{(0.135)} + \frac{40.3 \cdot \text{D7374}}{(104.2)}$$

$$1963-74 \quad \bar{R}^2 = 0.982 \quad \text{SEE} = \$68.8 \text{ mil.} \quad \text{DW} = 1.65$$

Again, replacement of OYP by OTAXB reduces the standard error of estimate substantially. Moreover, in conformity with expectations if OTAXB adequately captures exemption levels, the coefficient on  $\text{ORTYP} \cdot \text{RTYP}$  is not statistically significant. This coefficient begins again to approach significance when the dummy variable is included or when tax receipts are augmented by tax credits, but to nothing like the degree in the case of the coefficient on  $\text{ORTYP}$  alone.

To sum up then, OTAXB outperforms OYP both in Foot's specification involving only the Ontario rate  $\text{ORTYP}$  and in the specification including the TRACE rate,  $\text{RTYP}$ , as well. Similarly, when OTAXB is

used, inclusion of RTYP lowers the standard error of estimate by 16 per cent (from \$68.5 million to \$57.7 million). The equation which is favoured in terms of amount of structural information contained, conformity with a priori expectations, and simplicity is

$$OTYP = 0.585 * ORTYP * RTYP * OTAXB$$

This is the equation which has been used in the projections of Ontario personal income taxes reported in Chapter 5. In addition to the advantages already cited, it has the advantage in such projections of directly incorporating information on the personal income tax structure in the form in which it is included in the TRACE model of the national economy, RTYP. For example, the effect of indexing for inflation over the projection period is automatically translated into implications for personal income tax receipts in Ontario by way of this variable. In policy simulations, a similar advantage is derived.

However, RTYP is not just a measure of the federal rate of tax for which it has been used as a proxy. It is calculated in such a way as to include the effect of provincial share of basic federal tax, ORTYP, as well. RTYP is approximately equal to  $(1.0 + ORTYP)$  times the federal rate for which it has been used as a proxy, implicitly introducing a non-linearity with respect to ORTYP in the equations in which it appears. Adjusting RTYP according to this approximation yields an estimated coefficient which is essentially inversely proportional to the adjustment, so that projections would remain the same.

$$\text{OTYP} = \frac{0.756 * \text{ORTYP} * \text{RTYP}}{(1.0 + \text{ORTYP}) * \text{OTAXB}} \\ (0.015)$$

$$1963-74 \quad \bar{R}^2 = 0.981 \quad \text{SEE} = \$60.1 \text{ mil.}$$

The standard error of estimate is slightly larger than for the equation used in projections unless allowance is made for exemption levels by separate inclusion of the term  $\text{ORTYP} * \text{RTYP} / (1.0 + \text{ORTYP})$ . This term approaches significance when it should not (when OTAXB is used) but remains insignificant when it should play a role (when OYP is used). However, OTAXB still reduces the standard error of estimate substantially compared with OYP.

Similar difficulties are encountered when alternative attempts are made to purge RTYP of its ORTYP content. These alternatives are also, in any event, less attractive in projections and simulations because they sever the link with the TRACE model. They are problematic in interpretation because they tend to favour OYP over OTAXB even though the latter should be a better measure of taxable income, and they call for 'exemption level' terms whether theory does or not. The choice of 'best' equation is therefore a matter of judgment.

By criterion of standard error of estimate alone, the best equation for receipts gross of provincial tax credits, OTYPA, would be the one reported above, based on OTAXB but excluding any measure of federal rate. By this same criterion alone, the best equation for receipts net of pro-

vincial tax credits, OTYP, would have a standard error of estimate of only \$33.0 million (compared to the \$57.7 million for the equation selected for use in the projections). This equation would employ a dummy variable for the years 1973 and 1974, OYP rather than OTAXB as a measure of taxable income, a term for 'exemption levels' and a measure of the federal tax rate more refined than merely dividing RTYP by  $(1.0 + ORTYP)$ . Much of the 'improvement' would be lost without the dummy variables, inasmuch as the standard error of estimate would be \$51.0 millions. This would represent only about an 11 1/2 per cent reduction in standard error of estimate compared to the equation employed in the projections. The cost of obtaining this - sacrifice of the direct link to TRACE, and difficulties of interpretation - seemed to exceed any possible benefit involved.

#### A5.1.4 Ordinary Incorporated Income Taxes: OTYC

The only change in provincial corporation income tax over the period studied occurred in 1967 when the federal abatement was increased one per cent, permitting an increase in the provincial rate to 12 per cent. Corporate profits before tax in Ontario is used as a proxy for the true tax base, which is less because of numerous exemptions. Foot's best equation excluded the rate of taxation since the one change was not sufficient to



improve the result.

The tax rate (ORTYC) has been included in the following regressions to incorporate more structural information. The proxy tax base is OYC, corporate profits before taxes in Ontario.

$$\text{OTYC} = -328.35 + 326.05 \cdot \text{ORTYC} + 0.669 \cdot \text{ORTYC} \cdot \text{OYC}$$

(240.6)    (222.06)            (0.050)

$$1957-74 \quad \bar{R}^2 = 0.967 \quad \text{SEE} = \$29.8 \text{ mil.} \quad \text{DW} = 2.16$$

$$\text{OTYC} = 235.03 \cdot \text{ORTYC} + 0.719 \cdot \text{ORTYC} \cdot \text{OYC}$$

(133.3)                    (0.035)

$$1957-74 \quad \bar{R}^2 = 0.965 \quad \text{SEE} = \$30.6 \text{ mil.}$$

$$\text{OTYC} = 24.30 + 0.725 \cdot \text{ORTYC} \cdot \text{OYC}$$

(14.57)                    (0.034)

$$1957-74 \quad \bar{R}^2 = 0.964 \quad \text{SEE} = \$30.9 \text{ mil.} \quad \text{DW} = 1.81$$

$$\text{OTYC} = 0.774 \cdot \text{ORTYC} \cdot \text{OYC}$$

(0.018)

$$1957-74 \quad \bar{R}^2 = 0.961 \quad \text{SEE} = \$32.5 \text{ mil.}$$

The trouble with these results is that exemption levels are not captured correctly. The sign of the coefficient on ORTYC should be negative but is instead significantly positive, even when an ordinary constant is allowed for. The ORTYC term has therefore been excluded from the last two equations. The constant is nevertheless almost significantly positive, so that excluding it increases the standard error of estimate.

For all practical purposes, however, the standard error of estimate is about the same for all equations reported (and this remains true when the rate is excluded). For present purposes, it seems preferable to accept the last equation reported above because it incorporates rate information. Without the rate in this equation the standard error of estimate would be \$32.8 million. Foot also reported equations for premium income taxes, other corporation income taxes, and all other corporation taxes, not replicated here.

#### A5.1.5 Retail Sales Taxes: OTRS

The state of the legislation prevailing at the time his research was undertaken became the starting point for Foot's work. Thus amusements were included but tobacco excluded from retail sales. With the base therefore essentially consistent the problem that remained related to the fact that since 1969 there have been different rates for prepared meals, liquor, wine, bottled beer and amusements. Approximately 10 per cent of retail tax revenues derive from sales of items taxed at the higher rate.

Foot investigated two alternative ways of dealing with this situation. The first involved the use of a dummy variable to distinguish between the periods before and after 1969. The second instead incorporated a weighted average rate.

The variables are as follows:

ORS	Ontario retail sales
ORTS	unweighted rate of sales tax

ORTSW            weighted rate of sales tax

D69 = 1.0        fiscal 1969/70 and subsequently

$$\text{OTRS} = \frac{-5597.6}{(478.0)} \text{ORTS} + \frac{1.606}{(0.050)} \text{ORTS} \cdot \text{ORS} + \frac{99.103}{(17.063)} \text{D69}$$

$$1961-74 \quad \bar{R}^2 = 0.998 \quad \text{SEE} = \$20.11 \text{ mil.}$$

$$\text{OTRS} = \frac{-6756.9}{(463.6)} \text{ORTSW} + \frac{1.735}{(0.039)} \text{ORTSW} \cdot \text{ORS}$$

$$1961-74 \quad \bar{R}^2 = 0.998 \quad \text{SEE} = \$21.64 \text{ mil.}$$

Foot regarded both equations as satisfactory from a statistical point of view, but noted the unexpectedly large upward bias in the slope coefficient. The reduction obtained in standard error of estimate with the weighted-rate approach for his shorter sample period does not carry through to the extended sample period. However, we shall use the weighted average rate because of its relative efficiency in the original sample period and because of its greater structural content.

#### A5.1.6 Motive Fuels Taxes: OTMF

Motive fuel revenues come mainly from taxes on gasoline and on diesel fuels, with the rates on these now differentiated. The variables are defined as follows.

OGAS    is    Ontario sales of gasoline

ORTG    is    Ontario rate of tax on gasoline

ODIES is Ontario diesel sales

ORTD is Ontario rate of tax on diesel

Foot considered his reconciliation equation to be excellent because of the high degree of explanation, a slope very close to one and an intercept not significantly different from zero. The updated version is virtually identical.

$$\text{OTMF} = 1.015 * (\text{ORTG} * \text{OGAS} + \text{ORTD} * \text{ODIES}) \\ (0.004)$$

$$1955-74 \quad \bar{R}^2 = 0.999 \quad \text{SEE} = \$5.44 \text{ mil.}$$

Foot noted that the understatement resulting from the exclusion of aviation purchases from the base would appear to slightly more than offset the overstatement due to neglect of a number of exemptions for the nonroad use of vehicles, inasmuch as the coefficient is slightly greater than unity.

#### A5.1.7 Other Taxation: OT0

This category is a residual. It includes certain categories of taxation revenues for which Foot (1976) estimated individual equations. These were the following:

Revenue Category	Explanatory Variables
Corporate Premium Income Taxes 1957-72: SEE = \$1.55 mil.	: Gross Provincial Product and a dummy variable to capture the effect of a 1970 policy change.

Other Corporation Income Taxes 1957-72: SEE = \$0.88 mil.	:	Gross Provincial Product interactive with the tax rate, a dummy variable to capture a policy change effective in 1970, and this dummy interactive with the previous two variables.
All Other Corporation Taxes 1951-72: SEE = \$0.80 mil.	:	Gross Provincial Product
Succession Duties 1951-72: SEE = \$3.91 mil.	:	the number of deaths in Ontario, and per capita Gross Provincial Product.
Tobacco Products Taxes 1965-72: SEE = \$1.18 mil.	:	the tax rate on cigarettes and Canadian cigarette sales weighted by the proportion of Ontario population to total Canadian population.
Race Track Taxes 1954-72: SEE = \$1.66 mil. 1951-72: SEE = \$1.37 mil.	:	Provincial Personal Disposable Income, with the Provincial unemployment rate <u>or</u> interactive with the relevant rate of tax.
Land Transfer Taxes 1951-72: SEE = \$0.93 mil.	:	the interest rate on long-term government bonds and Gross Provincial Product interactive with the relevant tax rate.
Miscellaneous Taxes	:	exogenous.

One alternative is to take this category as exogenous. In a regression in which many of the explanatory variables listed above were included, three were clearly insignificant: the dummy variables distinguishing



post-1957 and post-1965 periods, and Ontario personal disposable income. Significant variables were a positive constant, positive Ontario Gross Provincial Product, positive Ontario unemployment rate and negative Ontario population. The positive sign on the unemployment rate is peculiar because Foot included it only in his equation for Race Track Taxes, where it had the expected negative sign. And of course the negative sign on Ontario population is also puzzling.

To see to what extent multicollinearity might be the problem, the equation was re-estimated using only Ontario Gross Provincial Product, OGPP, and population, OPOP. This simply reinforced the previous result. The equation is retained in this form, because multicollinearity does not seem to be the source of the difficulty. That is to say, when OGPP was replaced with OGPP per capita, the latter still had a positive sign and OPOP still had a negative sign (and both were highly significant statistically. Both are reported but the first is selected, because it is simpler and has a slightly lower standard error of estimate (which would, however, be even lower if the Ontario unemployment rate OUR were included as well)).

$$\text{OTO} = \begin{matrix} 777.39 & + & 16.389 \cdot \text{OGPP} & - & 141.6 \cdot \text{OPOP} \\ (227.0) & & (2.4) & & (41.6) \end{matrix}$$

$$1957-74 \quad \bar{R}^2 = 0.89 \quad \text{SEE} = \$43.3 \text{ mil.} \quad \text{DW} = 1.28$$

$$\text{OTO} = \begin{matrix} 590.8 & + & 143.5 \cdot (\text{OGPP}/\text{OPOP}) & - & 128.8 \cdot \text{OPOP} \\ (216.6) & & (22.3) & & (42.6) \end{matrix}$$

$$1957-74 \quad \bar{R}^2 = 0.877 \quad \text{SEE} = \$45.7 \text{ mil.} \quad \text{DW} = 1.21$$

$$\text{OTO} = \begin{matrix} 516.1 \\ (229.5) \end{matrix} + \begin{matrix} 14.819 \\ (2.2) \end{matrix} * \text{OGPP} - \begin{matrix} 111.2 \\ (38.9) \end{matrix} * \text{OPOP} + \begin{matrix} 23.4 \\ (10.1) \end{matrix} * \text{OUR}$$

$$1957-74 \quad \bar{R}^2 = 0.914 \quad \text{SEE} = \$38.2 \text{ mil.} \quad \text{DW} = 1.83$$

#### A5.1.8 Health Premiums: OHIP

The Ontario Hospital Services Commission (OHSC) came into being in 1956 to administer the operation of hospitals. When the Ontario Hospital Insurance Plan (OHIP) was introduced on January 1st, 1959, OHSC became responsible for it. In its annual reports it recorded health insurance premiums on a calendar year basis.

These are the data which Foot employed, basing them on the civilian labour force in the province, since all employed persons were insured through payroll deductions.

The premiums paid by families was twice that for individuals (except from 1966 to 1972 when families of more than two paid the top premiums in a three-tier structure). On the basis that 40 per cent of the certificates were issued to single people and that the family rate was twice the single. Foot calculated a weighted average rate equal to 1.6 times the rate for a single individual.

Applying this rate to employment somewhat overstates the case inasmuch as the premium is paid by only one member (rather than all employed members) of a family.

Medical premium revenue is not included in Foot's dependent variable as is apparent by examining the Ontario, Budget for recent years. For the

fiscal years 1970 and 1971, the latter data are approximately double the values in Foot's series. The ratio of fiscal 1969 to calendar 1969 is only 1.66 to 1.0 rather than 2 to 1. But this is essentially what we would expect if in fact revenues had doubled following amalgamation of the two plans. In other words, since the doubling would have held for the last quarter of calendar year 1969 and the first quarter of calendar year 1970, the ratio of fiscal year value to calendar year value should be 1.5 to 1.0. This is somewhat less than the actual 1.66 to 1.0 but growth could account for the difference.

In order to have a consistent series for estimation purposes, Foot excluded medicare premiums and terminated his sample period in 1971. For present purposes, however, it seems appropriate to try to proceed on a basis consistent with the present amalgamated plan.

This has been attempted in the following way. Prior to the fiscal year 1969/70 the dependent variable has been taken to be double the value of Foot's calendar year series on the basis of the observations cited above. From then on, the series reported in the Ontario, Budget has been used. Prior to the fiscal year 1966/67 Foot's rate series was also doubled. This is consistent with his statement that medical premiums were included in the series since 1966.

In summary, Foot's premium and rate series respectively are:

OGREVH	Ontario hospital insurance premiums (in millions of dollars)
ORTM	hospital insurance premium rate for a single family (in dollars per person per year)

For present purposes these have been incorporated as follows:

$$\text{OHIP} \equiv 2 \cdot \text{OGREVH}; \quad 1959-68$$

$$\equiv \text{OHIP premiums per Ontario, } \underline{\text{Budget}} \text{ subsequently}$$

$$\text{ORTHA} \equiv 2 \cdot \text{ORTH}; \quad 1959-65$$

$$\equiv \text{OHIP premium rate subsequently}$$

Employment in Ontario (in millions of persons) is represented as OLE.

$$\text{OHIP} = \begin{matrix} 36.292 + 8.655 \cdot (1.6 \cdot \text{ORTHA} \cdot \text{OLE}) \\ (24.088 \quad (0.581)) \end{matrix}$$

$$1959-74 \quad \bar{R}^2 = 0.937 \quad \text{SEE} = \$42.4 \text{ mil.} \quad \text{DW} = 1.71$$

#### A5.1.9 LCBO Profits: OGREVL

Foot could not explain profits of the liquor commission using the rate-base model. The appropriate base would be liquor sales. It was assumed that personal disposable income in the province OYD would be a suitable proxy for this base, together with the provincial unemployment rate OUR to capture cyclical influences. He also tested alternative specifications which used instead retail sales and corporate profits as proxies for the base but these were less successful.

$$\text{OGREVL} = \begin{matrix} -8.28 + 7.277 \cdot \text{OYD} - 1.894 \cdot \text{OUR} \\ (7.02) \quad (0.255) \quad (1.882) \end{matrix}$$

$$1951-74 \quad \bar{R}^2 = 0.975 \quad \text{SEE} = \$9.58 \text{ mil.} \quad \text{DW} = 1.21$$

This non-structural specification, selected as the best tested for the original sample period has not held up particularly well for some reason or other. An examination of the plot revealed large residuals in 1965 and 1974. The former is due to an inexplicably large value of the OGREVL series. With dummy variables for these years, the OUR is restored to significance, so this equation will be used.

$$\text{OGREVL} = -12.64 + 7.605 \cdot \text{OYD} - 2.038 \cdot \text{OUR} + 30.02 \cdot \text{D6868} - 30.16 \cdot \text{D7474}$$

$$(2.86) \quad (0.123) \quad (0.762) \quad (4.00) \quad (4.71)$$

$$1951-72 \quad \bar{R}^2 = 0.996 \quad \text{SEE} = \$3.84 \text{ mil.} \quad \text{DW} = 1.80$$

#### A5.1.10 Liquor Licences and Permits: OLLP

Foot used the reduced form version of the rate-base model with proxies for the relevant bases. The same group of variables as for liquor profits was tested: retail sales, corporate profits, the unemployment rate and personal disposable income. His best equation included only the latter variable.

$$\text{OLLP} = 2.217 \cdot \text{OYD}$$

$$(0.032)$$

$$1951-74 \quad \bar{R}^2 = 0.980 \quad \text{SEE} = \$2.69 \text{ mil.}$$

Foot reported that his equation tracked the medium-term growth trend well. Because the constant was not statistically significant in either equation, it has been dropped here. Since the equation is nevertheless virtually



identical to his, its performance will be that which he observed, that it underpredicts in the early 'sixties and overpredicts in the late 'sixties but always remains 'on trend'.

#### A5.1.11 Motor Vehicle Licences and Permits: OGREVV

Foot reported that the rate structure had been quite complicated over the sample period. As well as numerous changes in rates and base, a complicating feature is that revenues include fees levied on commercial vehicles as well as drivers' licences. Time series measures of the various bases were simply not available.

He was able to develop a series of the relevant fees for 6 and 8 cylinder passenger vehicles of 35 to 45 horsepower, which he combined in the proportions of 0.4 and 0.6, respectively (on the basis of registration figures for 1973, allocating 4 cylinder vehicles to the lower rate group and commercial vehicles to the higher). This weighted average rate (on a fiscal year basis) is called ORTV here. The base was taken to be the total number of vehicular registrations in Ontario, OMV. The updated version is the following.

$$\text{OGREVV} = \begin{matrix} 7.934 & + & 1.510 * \text{ORTV} * \text{OMV} \\ (3.008) & (0.044) \end{matrix}$$

$$1951-74 \quad \bar{R}^2 = 0.981 \quad \text{SEE} = \$7.88 \text{ mil.} \quad \text{DW} = 1.12$$

Foot interpreted the extent to which the slope coefficient exceeded unity as evidence that the calculated accrual series considerably understated

the true series.

This understatement was attributed to the fact that the licence fees applicable to commercial vehicles are greater than those applicable to 6 and 8 cylinder vehicles, which more than compensates for the lower fees applicable to 4 cylinder vehicles and motorcycles - and to the fact that the calculated accrual series does not include any imputation for revenues from drivers' licences, etc.

The following updated equation represents Foot's alternative reduced form model which he estimated, without fees, but including per capita disposable income OYD/OPOP as well as the total number of vehicular registrations OMV.

$$\text{OGREVV} = -71.50 + 49.836 \cdot \text{OMV} + 22.843 \cdot (\text{OYD/OPOP})$$

(4.83)    (6.59)                    (5.713)

$$1951-74 \quad \bar{R}^2 = 0.988 \quad \text{SEE} = \$6.20 \text{ mil.} \quad \text{DW} = 1.41$$

Compared to the original, substantial changes in slope coefficients and an increase in the SEE characterize the extended sample period. Whereas Foot could conclude that the average licence fee per vehicle had been \$33.48 over the period (taking account of rising per capita incomes) inflation appears to have increased this to \$49.84 over the extended sample period (subject to the interpretation to be placed upon the statistical significance of the negative constant).

A comparison of the two equations just presented, so far as the standard error of estimate is concerned, would clearly favour the

non-structural or reduced-form specification. However, in a combination of the two specifications, using all three explanatory variables, per capita disposable income turned out to be statistically insignificant. With this variable therefore dropped, the result was the following:

$$\text{OGREVV} = -37.314 + 77.592*(\text{ORTV}*\text{OMV}) + 37.474*\text{OMV}$$

$$(8.11) \quad (13.09) \quad (6.53)$$

$$1951-74 \quad \bar{R}^2 = 0.992 \quad \text{SEE} = \$5.03 \text{ mil.} \quad \text{DW} = 2.02$$

The standard error of estimate compares favourably with the other equations and the specification seems acceptable otherwise, so this equation is accepted as best for present purposes.

#### A5.1.12 Miscellaneous Other Revenue: OGREVM

Items in this category have already been listed in A5.1 and so need not be repeated here. Foot took most to be exogenous but had equations for fines and penalties.

For present purposes, one alternative would be to take the entire miscellaneous other revenue category as exogenous. Instead it has simply been related to Gross Provincial Product. Ontario population was also tried but was statistically insignificant, as was the constant. The equation therefore is:

$$\text{OGREVM} = 4.480*\text{OGPP}$$

$$(0.189)$$

$$1954-74 \quad \bar{R}^2 = 0.885 \quad \text{SEE} = \$24.3 \text{ mil.}$$

The SEE is almost 23 per cent of the sample mean, but it is doubtful that better projections could be made by taking this residual category as exogenous.

#### A5.1.13 Payments from the Federal Government: OGREVF

Foot made no attempt to econometrically explain payments from other levels of government. However, experiments were carried out with several equations estimated over the period 1954 to 1974 which might prove useful in terms of setting a benchmark based on past relationships against which projected exogenous policy changes might be assessed.

One approach to such experimentation was to relate payments from the federal government to Gross Provincial Product and population. The former variable proved significant statistically but the latter, somewhat surprisingly did not. An alternative approach to such experimentation was to relate payments from the federal government to certain categories of Provincial government revenues. The ones selected were:

OGREVT	Total Taxation Revenue, and
OGREVO	Total Other Revenue.

These two categories, together with the federal payments, OGREVF, and interest on investments, OGREVI, comprise the total budgetary revenue of the Province, OGREVB. The equations resulting from this experimentation are as follows:

$$\text{OGREVF} = -344.494 + 33.816 \cdot \text{OGPP}$$

(35.6)      (1.3)

$$1954-74 \quad \bar{R}^2 = 0.973 \quad \text{SEE} = \$77.9 \text{ mil.} \quad \text{DW} = 0.88$$

$$\text{OGREVF} = -98.737 + 0.181 \cdot \text{OGREVT} + 0.536 \cdot \text{OGREVO}$$

(24.6)      (0.044)      (0.146)

$$1957-74 \quad \bar{R}^2 = 0.985 \quad \text{SEE} = \$58.4 \text{ mil.} \quad \text{DW} = 1.19$$

Because of the lower SEE, the closer relationship with the Ontario budgetary process, and the somewhat less severe problem of positive autocorrelation, the second equation is preferred for the purpose set forth above. The SEE is only about 12 per cent of the mean for the sample period. But it must be remembered that this historical relationship could easily change in the future.

#### A5.1.14 Interest on Investments: OGREVI

The reason for setting interest on investments out on its own is to conform with the format of the Ontario, Budget publication of recent years. Foot took this category as exogenous evidently because additional information about its internal composition would be required before a reasonable specification could be formulated. This is no doubt a valid reason. However, when faced with the primary objective of projecting revenues over the years ahead, some sort of benchmark based on historical relationships is required against which to assess any exogenously specified judgments which might seem called for. Some experimentation along these lines, has therefore been undertaken using as possible explanatory variables



Gross Provincial Product, OGPP, and population, OPOP. The best of these equations is the following.

$$\text{OGREVI} = \begin{matrix} -18.335 & + & 9.120 & * & \text{OGPP} \\ (2.7) & & (0.66) \end{matrix}$$

$$1954-74 \quad \bar{R}^2 = 0.926 \quad \text{SEE} = \$31.0 \text{ mil.}$$

At about 30 per cent of the sample mean the SEE is high. An equation involving only per capita Gross Provincial Product does about as well and would perhaps be easier to interpret.

$$\text{OGREVI} = \begin{matrix} -156.271 & + & 73.526 & * & (\text{OGPP/OPOP}) \\ (18.033) & & (4.736) \end{matrix}$$

$$1954-74 \quad \bar{R}^2 = 0.923 \quad \text{SEE} = \$31.5 \text{ mil.} \quad \text{DW} = 0.87$$

But the first has been selected as adequate for benchmark projections. This specification is the same as that for OT0, the residual other taxation revenue category.

#### A5.1.15 Total Non-budgetary Revenue: OGREVN

As stated in A5.1, non-budgetary revenues (only about 6 per cent of total revenues) are mainly repayments of loans and advances on contributions to the non-trusted Public Service Superannuation Fund, Legislative Retirement Allowance Fund, the Municipal Employee's Retirement Fund, contributions to the Workmen's Compensation Board, and net savings deposits.

Foot had an equation for 'pension contributions', payments to the various government retirement funds, and for contributions to the Workmens

Compensation Board. Wages and salaries figured predominantly in both cases.

Since wages and salaries ultimately have to be related to Gross Provincial Product anyway, and in order to simplify things for present purposes, two alternative aggregate approaches have been considered here.

$$\text{OGREVN} = \underset{(146.1)}{623.463} + \underset{(1.9)}{18.287} * \text{OGPP} - \underset{(28.3)}{138.630} * \text{OPOP}$$

$$1954-74 \quad \bar{R}^2 = 0.913 \quad \text{SEE} = \$43.3 \text{ mil.} \quad \text{DW} = 1.90$$

$$\text{OGREVN} = \underset{(21.5)}{41.376} + \underset{(0.038)}{0.221} * \text{OGREVT} - \underset{(0.128)}{0.421} * \text{OGREVO}$$

$$1954-74 \quad \bar{R}^2 = 0.879 \quad \text{SEE} = \$51.1 \text{ mil.} \quad \text{DW} = 1.51$$

The first specification is the same as that selected for interest on investments, OGREVI, and other taxation revenue, OT0. The second specification based on the budgetary categories OGREVT, total taxation revenue, and OGREVO, total other revenue, should do relatively less well in explaining non-budgetary revenue. The first specification, involving essentially per capita Gross Provincial Product is clearly preferable. In a regression involving all four variables, only the first two were statistically significant, and OGREVT remained insignificant with OGREVO dropped. The per capita version of the first of these equations still had a negative coefficient on OPOP, so the version presented above was retained for present purposes.

## A5.2 ONTARIO EXPENDITURES

### A5.2.1 Background

Chapter IV of Foot (1976) examines the expenditure categories in historical perspective. This section briefly summarizes that review.

It was shown that the five Ministries of Health, Education, Treasury, Transportation and Social Services in recent years have accounted for nearly 85 per cent of total budgetary expenditures by the Province of Ontario. Over the decade of the 'sixties there was relatively rapid growth in education expenditures; so far in the 'seventies growth has centered on health expenditures, with social services relatively constant and transportation declining.

Documentation is more difficult for expenditure categories than for revenues because new programs may emerge within existing structures, even in the form of 'repackaging' of already existing programs. Similarly, programs are usually phased out rather than abruptly terminated.

Nevertheless, it was clear that education and highway construction were highly emphasized in the early postwar period. Social services legislation involved the government essentially in a regulatory way with respect to education, liquor, health, traffic and employment, in relation to programs for minimum incomes for the very poor, labour standards, mental hospitals, Workmen's Compensation and anti-discrimination legislation. Social capital development took off during the early

'fifties with extensive highway construction (including the Trans-Canada Highway), the expansion of hospitals, elementary schools and homes for the aged.

The universal old age pension for all citizens over 70 instituted by the federal government in 1952 left the Province only with responsibility for the shared-cost means test program for those aged 65-69, thus enabling it to introduce pensions for the disabled and to extend mothers' allowances.

Federal social policy initiatives continued into the late 'fifties. The provincial share of income tax was increased in 1957, conditional payments for old age pensions and unemployment insurance benefits were raised. Other changes in conditional grants policy persuaded Ontario to begin unemployment assistance (1958), hospital insurance (1959) and technical and vocational education (1957 and 1960-61). Grants for the operating and capital expenditures of universities also became increasingly important.

As the 'fifties drew to a close, the province became more involved in low rental housing, child welfare and reform institutions, home care, rehabilitation, recreational facilities and other services. These were all expanded in the early 'sixties.

In the mid-'sixties post-secondary education expenditures expanded dramatically. The Universities Capital Aid Corporation and a new Department of University Affairs were established in 1964. 1965 legislation creating Colleges of Applied Arts and Technology (CAATS)

led to the opening of the first such institution in the following year. Reorganization of the Department of Education, designed in large part to encourage consolidation of elementary and secondary school administration was also accompanied by establishment of the Ontario Institute for Studies in Education (OISE) and the Ontario Educational Communications Authority (OECA). Greatly expanded federal unconditional contributions were made available for post secondary education in the federal Adult Occupational Training Act of 1967.

The renaming of the provincial Department of Public Welfare as Social and Family Services ushered in significantly changed programs in these areas. Meanwhile the federal government introduced the Canada Assistance Plan (CAP) for those in need and the Canada Pension Plan (CPP) as a contributory expansion to the old age security system. (The provinces subsequently made extensive use of these pension funds for borrowing.)

The Ontario Hospital Services Commission (OHSC) was established in 1956 to oversee the operation of hospitals, but health insurance continued to be available only in the private sector. In 1959 OHSC took over administration (but not underwriting) of this service. In 1966 the government instituted an optional plan of medical insurance, subsidised for those who needed it, and on a full premium basis to everyone else: the Ontario Medical Services Insurance Plan (OMSIP). This was replaced on October 1, 1969 by the Ontario Health Services Insurance Plan (OHSIP) which integrated the hospital and medical plans. This



integration, which enabled the province to qualify for cost-sharing under the Federal Medicare Act of 1966, required establishment of the Health Insurance Registration Board (HIRB) to register and collect the premiums for both the hospital and medical plans. The late 'sixties also brought extensions of mental health services, special care homes for chronic mental patients, and increased grants to public health units.

This extension of social overhead capital was reflected in other areas as well. In 1966 a legal aid fund was established to assist needy clients, and in 1968 the province relieved municipalities of the costs of administration of justice.

The early 'seventies brought more of the same. The economic slump of 1969 and 1970 led the federal government to liberalise unemployment insurance benefits, extend youth allowances to higher age groups, lower old age security eligibility to 65, extend CAP to include mothers' allowances for the needy and to cover such provincially-assisted special institutions as those for the aged and unwed mothers. The provincial government was accordingly enabled to expand some other social services (such as institutions for retarded children) and to create others (such as a Guaranteed Annual Income System (GAINS) for the elderly, blind and disabled).

The government takeover of most health insurance was completed on April 1, 1972, with the introduction of the Ontario Health Insurance Plan (OHIP), a single-payment plan for both hospital and medical

insurance, which eliminated the administrative agencies associated with previous plans (and approximately doubled the budget of the Ministry of Health).

The Ontario Housing Corporation (OHC), a Crown corporation since 1964, expanded low-rental housing with 50 per cent assistance from the federal government through Central Mortgage and Housing Corporation (CMHC), and also undertook the Home Ownership Made Easy (HOME) program, mortgages and mortgage guarantees, especially for condominiums and the acquisition, servicing and leasing of land. The 1973 creation of the Ministry of Housing gave central planning and direction to these programs. The basic shelter grants introduced in 1968 were replaced in the 1972 taxation year by a Provincial property tax credit plan, administered by the Federal government and designed to reflect ability to pay.

The categories of expenditure discussed above are meaningful in setting the historical perspective. They reveal the changing role of the Ontario government, which began the postwar period primarily as a regulator of activity but evolved by the mid-fifties as a builder of social overhead capital (in the form of highways, hospitals and schools), a role which it later expanded (in the areas of university and other post secondary facilities, and housing construction). By the mid-'sixties the government had also taken on a substantial role as provider of services in the areas of health and social policy, justice and housing. These three historic roles - as regulator of activity, builder of social overhead capital, and provider of social services - now constitute

the bulk of Ontario provincial expenditures.

But such broad categories must be disaggregated into more detailed and consistent series for analysis of determinants.

This detailed information can be found in Ontario, Public Accounts (classified by Ministry or Department) and in Canada, Provincial Government Finance, Revenue and Expenditure (classified by expenditure function).<sup>2</sup> For present purposes, the former is the preferred source, since classification by Ministry is exactly what is required. We must still assure ourselves, however, that the expenditure categories:

- (a) remain unchanged over time, and
- (b) are based on consistent definitions.<sup>3</sup>

Foot pointed out that satisfaction of these criteria was a difficult task which had not been undertaken at the provincial level (and, of course, only by expenditure function by Statistics Canada). Ontario, Public Accounts provide little by way of explanation to facilitate the task.

The research strategy adopted by Foot concentrated on the 'most important' ministries. Consistent expenditure categories for these were accordingly developed. In order of expenditure rank, these ministries

---

2 The latter used Ontario, Public Accounts as the basis.

3 Foot (1976) imposed these criteria on both revenue and expenditure categories.

were the following.<sup>4</sup>

84%	{	1. Health (4) 2. Education (4) 3. Treasury, Economics and Intergovernmental Affairs (1) 4. Colleges and Universities (4) 5. Transportation and Communications (3) 6. Community and Social Services (4)
-----	---	---

11.5%	{	7. Housing (1) 8. Government Services (1) 9. Environment (3) 10. Natural Resources (3) 11. Revenue (1) 12. Agriculture and Foot (3)
-------	---	--

13. Solicitor General (2)  
 14. Correctional Services (2)  
 15. Attorney General (2)

The programs of these 15 were classified into 35 expenditure categories which for 1972/73 included approximately 90 per cent of

---

4 Numbers in parentheses following each Ministry designate the policy field: (1) general government, (2) justice, (3) resources development, and (4) social development. Based on 1974/75 data, the first six represent about 84 per cent and the second six another 11.5 per cent of total budgetary expenditures. Thus 12 out of 28 ministries spent over 95 per cent of the provincial budget. The next 3 together with 16, Industry and Tourism (3) bring the cumulative total to over 99 per cent.

total budgetary expenditures:

1. Health Administration
2. Mental Health
3. Public Health
4. Hospitals
5. Health Insurance
6. School Authorities
7. Post-Secondary Education
8. Special Education
9. Cultural Education
10. Administration and Other (Education)
11. Superannuation (Education)
12. Debt Transactions
13. Pension Funds
14. Development Loans
15. Tax Diminution
16. Administration (TEIGA)
17. (Highway) Maintenance
18. ( " ) Construction
19. Administration (Transportation)
20. Income Maintenance
21. Child and Youth (Welfare)
22. Adult Services
23. Community Services



24. Rehabilitation
25. Day Nurseries
26. Housing
27. Provision of Accommodation
28. Other Government Services
29. Environment
30. Natural Resources
31. Revenue
32. Agriculture
33. Ontario Provincial Police
34. Justice (Other)
35. Correctional Services

#### A5.2.2 Empirical Analysis of the Expenditure Categories

The theoretical basis for analysis of the expenditure categories is presented in Chapter VI of Foot (1976). The formal model used is a partial adjustment model, wherein desired real expenditures per capita are considered for possible relation to one or more of nine expenditure determinant hypotheses.

Insofar as possible the equations reported below are re-estimates of his equations, with the sample period extended by two years.

All monetary variables are expressed in 1971 dollars of constant purchasing power. The deflator used for expenditures was the implicit price index for government current expenditure on goods and services in

the National Expenditure Accounts (adjusted for fiscal years). Foot deflated all income variables by the Consumer Price Index. Although this is in accord with standard practice, the implicit price index for consumer goods and services from the National Expenditure Accounts has been used here instead because this index is explained within the TRACE model whereas the Consumer Price Index is not.

A partial-adjustment model of the expenditure process postulates some 'desired' level of expenditures in any period ( $EXD_t$ ), determined by some (one or more) independent variable(s)  $X_t$ , such that

$$EXD_t = \alpha + \beta * X_t$$

Through possible ignorance of this exact desired level, or inertia arising from the complexities of its organizational structure, the government is represented as adjusting only partially, during any given year, to the gap between the desired level of expenditures in a particular category for that year and the actual prevailing level of such expenditures in the preceding year:

$$EX_t - EX_{t-1} = \mu * (EXD_t - EX_{t-1})$$

The parameter  $\mu$  is the adjustment factor. The closer it is to unity, the more rapid the adjustment. Substitution of the (first) 'desired' relationship into the (second) adjustment relationship yields the general form of the equation for econometric estimation:

$$EX_t = (\mu * \alpha) + (\mu * \beta) * X_t + (1 - \mu) * EX_{t-1}$$

The explanatory variable  $X$  is taken to be personal disposable income in the 'preliminary' equation tested for all expenditure categories in Foot (1976),

The only problems were an incorrect negative sign on the income variable for education administration, development loans, highway maintenance and highway construction, plus poor explanation of debt transactions and both categories of government services.

The preliminary equations were then extended to test for the remaining expenditure hypotheses. Evidence in support of one or more of these was found for one third of all equations.

Availability of federal health funds and urbanization appeared to have influenced expenditures on hospitals. Federal funds and the proportion of the population in the school-age group appeared to have influenced expenditures on Assistance to School Authorities (which covers both primary and secondary expenditures). Essentially the same was true for Post-Secondary Education expenditures although, of course, it was the 20-24 age group that was relevant.

Education Administration and Superannuation expenditures proved intractable. And the treasury (TEIGA) categories presented real problems,

---

5 Hospitals, Assistance to School Authorities, Post-Secondary Education, Income Maintenance, Child and Youth Services, Adult Services, Rehabilitation Services, Other Government Services, and Revenue. Highway Maintenance and Highway Construction were included for illustrative purposes only, inasmuch as the elections dummy variable posed problems for projections.

being in such large part discretionary, e.g., Debt Transactions, Development Loans and Tax Diminution.

Within the Community and Social Services grouping, federal funds and urbanization were important for Income and Maintenance. For Child and Youth Services, the proportion of the population under 19 was preferable to urbanization. Rehabilitation Services appeared to depend on federal funds.

In summary, Foot found that the 'preliminary' equation explained 16 expenditure categories and, appropriately extended by other variables another 9 (of which only 4 retained the lagged dependent variable, however) but that 8 categories could not be explained by the expenditure hypotheses outlined in his study.

Herein, Foot's preliminary equation has been estimated only for the first 23 expenditure categories, but with the sample period extended to 1974-75. These results are reported in Table A5.3. As footnote 6 to the table explains, the equation for hospitals has been extended beyond 1971/72, although he was not prepared to do so. The Ministries included are the first six in order of expenditure according to Ontario, Estimates (1974-75), comprising about 84 per cent of the budget.

1. Health
2. Education
3. Treasury, Economics and Intergovernmental Affairs
4. Colleges and Universities
5. Transportation and Communications
6. Community and Social Services

A 24th equation, for Day Nurseries, has been added for Community and Social Services. Resources did not permit extension of the re-estimation procedure to the next six Ministries in order of expenditure rank (involving another ten equations in Foot's tabulation, bringing the total share of budget up to 95 per cent). An equation for the residual was estimated on the preliminary specification bringing the overall predictive power up to much the same share. This equation is not reported, however, because it appeared to generate excessively rapid growth of the residual in projections.

Foot found it advisable to extend his preliminary equation for nine of his first 23 expenditure categories. Here this has been done for 11, as reported in Table A5.4. The only exception to his 9 is Adult Services, for which the basic equation is retained here. The three additional categories modified here are Special Education, Education Administration and Debt Transactions.

The additional variable for Special Education is URB, an index of urbanization. This is also true for Education Administration, where the index replaces income. The equation for Debt Transactions involves only income and D65, a dummy variable for 1965/66, reflecting a large fluctuation in the series for that year for which there is no apparent explanation.

Of the 8 modified expenditure categories common to Foot and this update, the modified specification is the same in 6 cases. The equation for Hospitals includes federal funds and the urbanization index, but



omits the lagged dependent variable. In the case of Post-Secondary Education, the specification is extended to include federal funds and OP2024, the proportion of the Ontario population aged 20-24. Highway Maintenance and Highway Construction equations omit income but add DEL, a dummy variable for election years. Income is also excluded from the equation for Child and Youth Services, while federal funds and OP019, the proportion of the Ontario population aged 19 and under are included.

In the case of Assistance to School Authorities, the specification follows Foot by including federal funds and OP519, the proportion of the Ontario population aged 5-19, but there is no longer a significant role for income.

On the other hand, whereas his equation for Income Maintenance included only federal funds and the urbanization index, for the extended sample period there are additional explanatory roles of significance for income and OUR, the Ontario unemployment rate.

TABLE A5.3: RESULTS FOR THE 'PRELIMINARY'  
PER CAPITA EXPENDITURE EQUATION<sup>1</sup>

Expenditure Category	Estimation Period <sup>2</sup>	$\beta_0$ (s.e.)	$\beta_1$ (s.e.)	$\beta_2$ (s.e.)	$\bar{R}^2$	SEE <sup>3</sup>	DW <sup>4</sup>
Health Administration <sup>5</sup>	1951-74	-1.655 (0.559)	0.912 (0.304)	0.607 (0.177)	0.976	0.214	1.62
Mental Health <sup>6</sup>	1951-74	-2.571 (1.819)	2.325 (1.574)	0.804 (0.164)	0.985	0.603	1.75
Public Health	1951-74	-2.551 (1.458)	1.369 (0.720)	0.862 (0.113)	0.960	0.698	1.10
Hospitals <sup>7</sup>	1957-74	-10.287 (20.971)	7.140 (14.720)	0.952 (0.244)	0.987	3.511	2.32
Assistance to School Authorities	1951-74	29.752 (27.687)	-14.937 (16.061)	1.175 (0.192)	0.977	6.561	1.79
Post-Secondary Education	1951-74	-26.807 (15.612)	14.040 (7.496)	0.810 (0.125)	0.970	5.534	1.19
Special Education	1951-74	-0.276 (0.150)	0.178 (0.093)	0.781 (0.144)	0.983	0.046	1.72

1 As fully described in the text, variables are measured in constant dollars per capita.  $\beta_0$  is the constant,  $\beta_1$  is the coefficient on real personal disposable income per capita, and  $\beta_2$  is the coefficient of the lagged dependent variable.

2 For example, 1952-72 means fiscal 1952/53 to 1972/73.

3 Millions of 1971 dollars per capita.

4 Because of inclusion of the lagged dependent variable, the DW statistic is biased towards accepting the null hypothesis, and so should be interpreted with caution.

5 Equation includes a dummy variable for 1974-75 with a coefficient of 2.413 (0.271).

6 Equation includes a dummy variable for 1973/74 and 1974/75 with a coefficient of -1.053 (0.610).

7 Foot did not extend his equation beyond 1971/72 because of the termination of the OHSC on July 1, 1972, when its responsibilities were transferred to the Treatment and Rehabilitation Division of the Ministry of Health (and the provincial government hospital and medical care insurance plans were amalgamated into a single premium). Data have been taken from the Public Accounts for subsequent years.

TABLE A5.3: RESULTS FOR THE 'PRELIMINARY'  
PER CAPITA EXPENDITURE EQUATION  
(Continued)

Expenditure Category	Estimation Period <sup>2</sup>	$\beta_0$ (s.e.)	$\beta_1$ (s.e.)	$\beta_2$ (s.e.)	$\bar{R}^2$	SEE <sup>3</sup>	DW <sup>4</sup>
Cultural Education	1951-74	-1.462 (0.665)	0.745 (0.317)	0.848 (0.098)	0.982	0.236	1.02
Education Administration	1951-74	0.459 (0.423)	-0.159 (0.551)	1.004 (0.124)	0.924	0.319	1.84
Superannuation	1951-74	-4.605 (1.828)	2.929 (1.052)	0.565 (0.176)	0.919	0.929	1.79
Debt Transactions	1951-74	20.520 (21.663)	1.746 (7.157)	0.570 (0.177)	0.330	16.538	1.99
Pensions	1951-74	-6.050 (2.367)	3.230 (1.207)	0.592 (0.173)	0.979	0.552	1.61
Development Loans	1961-74	29.208 (30.892)	-8.315 (12.377)	0.941 (0.154)	0.858	12.621	0.88
Tax Diminution <sup>8</sup>	1951-74	-17.589 (5.211)	9.860 (2.672)	0.635 (0.131)	0.939	2.770	2.50
TEIGA Administration	1951-74	-3.184 (1.608)	1.558 (0.726)	0.743 (0.151)	0.901	0.837	1.69
Highway Maintenance	1951-74	2.358 (4.637)	0.276 (0.839)	0.840 (0.136)	0.780	1.258	2.09
Highway Construction	1951-74	12.947 (5.511)	-1.336 (2.040)	0.790 (0.106)	0.741	4.399	1.66
Transportation Administration <sup>9</sup>	1951-74	-2.200 (1.724)	1.126 (0.890)	0.933 (0.097)	0.986	0.601	2.29

8 Equation includes a dummy variable for 1972/73 with a coefficient of -19.819 (3.196).

9 Equation includes a dummy variable for 1965/66 with a coefficient of 5.907 (0.699).

TABLE A5.3: RESULTS FOR THE 'PRELIMINARY'  
PER CAPITA EXPENDITURE EQUATION  
 (Continued)

Expenditure Category	Estimation Period <sup>2</sup>	$\beta_0$ (s.e.)	$\beta_1$ (s.e.)	$\beta_2$ (s.e.)	$\bar{R}^2$	SEE <sup>3</sup>	DW <sup>4</sup>
Income Maintenance	1951-74	-8.817 (4.944)	6.989 (3.276)	0.591 (0.190)	0.950	1.967	2.00
Child and Youth Services	1951-74	-0.851 (1.087)	0.552 (0.565)	0.868 (0.140)	0.956	0.438	1.36
Adult Services	1951-74	-4.000 (1.158)	2.437 (0.668)	0.357 (0.192)	0.951	0.420	1.98
Community Services	1951-74	-0.801 (0.299)	0.411 (0.141)	0.599 (0.148)	0.878	0.178	1.90
Rehabilitation Services	1951-74	-0.093 (0.372)	0.045 (0.167)	1.152 (0.178)	0.988	0.059	1.41
Day Nurseries	1951-74	-0.643 (0.303)	0.301 (0.132)	0.809 (0.145)	0.875	0.188	2.05

TABLE A5.4: MODIFICATIONS TO THE 'PRELIMINARY' EQUATION  
FOR SELECTED EXPENDITURE CATEGORIES<sup>1</sup>

Expenditure Category	Intercept	Income	Lagged Expenditure	Federal Funds	Other Variables <sup>2</sup>	R <sup>2</sup>	SEE <sup>3</sup>	DW
Hospitals	-92.820 (35.679)	44.256 (6.027)		0.262 (0.116)	0.860*URB (0.684)	0.987	3.562	2.06
Assistance to School Authorities	-46.774 (18.858)		0.815 (0.044)	0.379 (0.161)	2.183*OP519 (0.781)	0.989	4.603	2.13
Post-Secondary Education	-68.651 (31.654)	16.302 (8.124)	0.535 (0.191)	0.382 (0.149)	5.471*OP2024 (3.012)	0.979	4.906	1.52
Special Education	-0.721 (0.237)	0.139 (0.086)	0.717 (0.134)		0.012*URB (0.005)	0.986	0.042	2.03
Education Administration	-5.748 (2.015)		0.358 (0.146)		0.161*URB (0.049)	0.891	0.381	0.98
Debt Transactions		19.666 (0.517)			22.111*D65 (6.174)	0.740	6.030	2.16
Highway Maintenance	3.700 (1.694)		0.796 (0.081)		1.076*DEL (0.548)	0.830	1.160	2.05
Highway Construction	8.332 (4.249)		0.799 (0.096)		3.378*DEL (2.015)	0.767	4.173	1.44



TABLE A5.4: MODIFICATIONS TO THE 'PRELIMINARY' EQUATION  
FOR SELECTED EXPENDITURE CATEGORIES<sup>1</sup>  
(Continued)

Income Maintenance	-42.758 (7.241)	8.242 (2.031)	0.190 (0.020)	0.725*OUR (0.310)	0.972	1.546	1.84
				0.743*URB (0.191)			
Child and Youth Services	-3.452 (1.603)		0.838 (0.122)	0.033 (0.028)	0.097*OP019 (0.043)	0.397	1.52
Rehabilitation Services			0.965 (0.076)	0.006 (0.002)	0.203*D7374 (0.051)	0.994	1.61

1 Estimation period is 1951-74; Hospitals 1957-74, Debt Transactions 1965-74, Rehabilitation Services 1956-74.  
2 Variables defined in the text.  
3 Millions of 1971 dollars per capita.

### A5.3 LINKING EQUATIONS FOR THE REVENUE AND EXPENDITURE PROJECTIONS

The thirteen revenue categories for which equations have been presented in A5.1 depend upon other variables in turn, and these other variables are of three sorts: those determined by identities, those which are exogenously determined policy instruments (essentially rates of taxation) and those which are linked either to national variables which are endogenous in the TRACE model of the Canadian economy, or to other Ontario variables which are linked in this way to TRACE. For the latter group we require equations linking the Ontario variables to the national variables explained by the TRACE model.

Variables determined by identities are OTAXB, the Ontario personal income tax base, OGREVT, Total Taxation Revenue and OGREVO, Total Other Revenue. These identities were presented in section A5.1.2 above.

Exogenous policy instruments are the following:

ORTYP	Ontario share of personal income tax
RTYP	TRACE rate of personal income tax
EXL	personal income tax exemption level
ORTYC	Ontario rate of corporate income tax
ORTSW	Ontario weighted rate of tax on retail sales
ORTG	Ontario rate of tax on gasoline
ORTD	Ontario rate of tax on diesel fuel
ORTHA	Ontario health insurance premium rate
ORTV	Ontario weighted rate of tax on vehicles

Equations linking Ontario variables to national variables which are endogenous in the TRACE model of the Canadian economy are listed below. The prefix O designates an Ontario variable. The rest of the variable notation is that employed in TRACE for a national variable.

personal income:

$$\text{OYP} = -0.293 + 0.414 \cdot \text{YP} \\ (0.119) \quad (0.002)$$

$$1950-74 \quad \bar{R}^2 = 0.999 \quad \text{SEE} = \$0.308 \text{ bil.} \quad \text{DW} = 0.61$$

personal disposable income:

$$\text{OYD} = -0.299 + 0.409 \cdot \text{YD} \\ (0.089) \quad (0.002)$$

$$1950-74 \quad \bar{R}^2 = 0.999 \quad \text{SEE} = \$0.214 \text{ bil.} \quad \text{DW} = 0.74$$

corporate profits before taxes:

$$\text{OYC} = -0.069 + 0.454 \cdot \text{YC} \\ (0.008) \quad (0.001)$$

$$1951-74 \quad \bar{R}^2 = 0.999 \quad \text{SEE} = \$0.020 \text{ bil.} \quad \text{DW} = 1.87$$

gross provincial product (current dollars):

$$\text{OGPP} = -1.231 + 0.422 \cdot \text{GNPV} \\ (0.152) \quad (0.002)$$

$$1950-74 \quad \bar{R}^2 = 0.999 \quad \text{SEE} = \$0.382 \text{ bil.} \quad \text{DW} = 0.64$$

Canada pension plan contributions:

$$\text{OSOPP} = 0.034 + 0.215 \cdot \text{SOPP} \\ (0.013) \quad (0.016)$$

$$1966-74 \quad \bar{R}^2 = 0.960 \quad \text{SEE} = \$0.009 \text{ bil.} \quad \text{DW} = 1.75$$

The following equations link Ontario variables to other Ontario variables and in some cases to national variables as well.

retail sales:

$$\begin{aligned} \text{ORS} &= 2.068 + 0.404 \cdot \text{OYD} \\ &\quad (0.101) \quad (0.006) \\ 1950-74 \quad \bar{R}^2 &= 0.995 \quad \text{SEE} = \$0.247 \text{ bil.} \quad \text{DW} = 0.62 \end{aligned}$$

motor vehicle registrations:

$$\begin{aligned} \text{OMV} &= 0.422 + 0.116 \cdot (\text{OYD/PC}) \\ &\quad (0.051) \quad (0.003) \\ 1955-74 \quad \bar{R}^2 &= 0.999 \quad \text{SEE} = \$0.07 \text{ mil. regs.} \quad \text{DW} = 0.76 \end{aligned}$$

gasoline sales:

$$\begin{aligned} \text{OGAS} &= -0.332 + 0.761 \cdot \text{OMV} \\ &\quad (0.039) \quad (0.015) \\ 1955-74 \quad \bar{R}^2 &= 0.993 \quad \text{SEE} = 0.04 \text{ mil. gals.} \quad \text{DW} = 1.18 \end{aligned}$$

sales of diesel fuel:

$$\begin{aligned} \text{ODIES} &= -0.242 + 0.135 \cdot \text{OMV} \\ &\quad (0.029) \quad (0.011) \\ 1955-74 \quad \bar{R}^2 &= 0.887 \quad \text{SEE} = 0.03 \text{ mil. gals.} \quad \text{DW} = 0.25 \end{aligned}$$

military employment:

$$\begin{aligned} \text{OLGM} &= 0.084 + 0.541 \cdot (\text{LGM/LE}) - 0.020 \cdot (\text{LE/OLE}) - 0.004 \cdot \text{OLE} \\ &\quad (0.039) \quad (0.235) \quad (0.012) \quad (0.003) \\ 1962-74 \quad \bar{R}^2 &= 0.952 \quad \text{SEE} = 0.6 \text{ mil.} \quad \text{DW} = 1.68 \end{aligned}$$

National and provincial employment are designated respectively by LE and

OLE. No linking equation is required for the latter because values are generated by the sub-model of industrial distribution described in Appendix 6.1. Provincial population, OPOP, is similarly determined by the Ontario population model (see Appendix 3.1), while the labour force is determined by the submodel described in Appendix 3.3. The provincial unemployment rate, OUR, is determined by the interaction of the two.

Except for Canada Pension Plan contributions, OSOPP, and military employment OLGM, the equations listed above are used in the same explanatory roles in Foot (1975b). They have simply been updated here.

Following Foot (1976) the deflators have been transformed to a fiscal year basis. But the equations are specified differently. The equation relating the fiscal-to-calendar-year implicit price index of personal expenditure on consumer goods and services is the following:

$$\begin{aligned} \text{FISCPC} &= 1.0 \cdot \text{PC} + 0.28 \cdot \Delta \text{PC} \\ &\quad (0.001) \quad (0.03) \\ 1950-74 \quad \bar{R}^2 &= 0.9995 \quad \text{SEE} = 0.003 \end{aligned}$$

The same specification is used for the implicit price index of government current expenditure on goods and services.

$$\begin{aligned} \text{FISCPCG} &= -0.003 + 1.0 \cdot \text{PCG} + 0.21 \cdot \Delta \text{PCG} \\ &\quad (0.0016) (0.004) \quad (0.03) \\ 1950-74 \quad \bar{R}^2 &= 0.9999 \quad \text{SEE} 0.002 \quad \text{DW} = 1.96 \end{aligned}$$

Inclusion of the change in the price index eliminated the statistically significant time trend incorporated in Foot's equations.



As stated above, the reader interested in a more complete discussion of the methodology employed in estimating equations (for revenues as well as expenditures) should consult Foot (1976), the source of the approach taken here. So far as expenditure projections are concerned, however, one aspect of methodology perhaps calls for special consideration here, because of the attention it attracted in the course of the preparation of this study. Among the alternative hypotheses considered as possible explanations for various categories of government expenditures in Foot (1976) is the so-called 'revenue-led' expenditures hypothesis. According to this argument, the availability of revenues makes it easier to launch new programs or expand those already established, so that a proximate 'explanation' of increases in expenditures lies in increases in revenues, over the same or some recent year. To the extent that revenues arising from federally provided funds under shared cost programs have been incorporated in a few expenditure equations, there is empirical support for this hypothesis and it has been incorporated in the expenditure projections. Those who believe in the hypothesis, however, would generally afford it wider application. Foot (1976) acknowledged this support and suggested the need for further analysis. Consequently, for present purposes, some attempt was made to investigate it. The 'preliminary' equation actually employed for individual expenditure categories, as described above, specified the dependent variable in real per capita terms, as a function of real per capita personal disposable income and the dependent variable lagged one period. Except for federal funds tied to particular expenditure categories

through shared cost programs, it is impossible to match particular revenue sources with particular expenditures and therefore impossible to define an appropriate revenue variable for inclusion along with real per capita personal disposable income in such equations as a test of the 'revenue-led' expenditures hypothesis. Nor would it make sense to include total revenues in this role, inasmuch as such a procedure would ignore other commitments which could be expected to be 'charged' against revenues apart from the expenditure category under consideration. The only option would therefore appear to be to test the hypothesis in the aggregate. Accordingly, the 'preliminary' equation was estimated for aggregate expenditures, with real aggregate revenues per capita included as an explanatory variable in addition to real personal disposable income. In terms of statistical significance, the latter was displaced by the former. At first sight this might appear to be impressive support for the 'revenue-led' expenditures hypothesis. Indeed, if real per capita borrowed funds are included as well, these afford further positive, statistically significant 'explanation' of total expenditures.

The economic significance of these results is, however, problematic at best. There may be no 'explanation' of expenditures in any behavioural sense at all. Rather the results can be attributed to a statistical artifact arising out of the budget identity whereby total expenditures amount to the sum of total revenues plus borrowings.

This is not to deny the 'revenue-led' expenditures hypothesis, but rather to emphasize the difficulty of testing or validating it. The

economic literature is inadequate in this respect and there can be no doubt that the issue merits further consideration. Given the underdeveloped state of the art, such investigations lie beyond the scope of this study. There is a sense, nevertheless, in which the views of adherents to the hypothesis are reflected in this study. In the assessment of the implications of the projections of revenues and expenditures it is argued that actual expenditures cannot be allowed to grow at rates as high as those projected because of the financing problems that would arise. In effect, therefore, the argument is that unless the revenues are there the expenditures cannot take place. This may, or may not, be what adherents to the 'revenue-led' expenditures hypothesis have in mind. In any event, it is a consequence of the budget constraint, wherein lies the difficulty of econometric verification.

OUTPUT AND EMPLOYMENT

by

John A. Sawyer

6.1 INTRODUCTION

In Chapter Two a possible scenario for the Canadian economy as a whole was examined. This scenario was characterised by high energy prices which result in substantial energy investment in the latter part of the 1970s and the early 1980s, a slowdown in the rate of growth in world trade, and a lower rate of population growth than has been experienced in the recent past. Given these assumptions, a pattern of growth in industry output and employment for the Canadian economy was derived. In this chapter these trends for the national economy are translated into the outlook for output and employment in Ontario industries. The methodology for doing this is described in the Appendix to this chapter.<sup>1</sup>

---

1 The analysis in this Chapter complements an earlier pair of studies by the Policy Planning Branch, Ministry of Treasury, Economic and Intergovernmental Affairs (TEIGA), Long Term Economic Outlook for Ontario and A Long Term Projection of Ontario's Industrial Development Pattern (June, 1976). The general profile of these studies and the present study are similar. No comparison of the reasons for the differences in the projections is made, however, because the TEIGA studies do not state precisely the assumptions underlying the projection or the models used. It is recommended that the reader also read the TEIGA studies.



## 6.2 SOURCES OF GROWTH

To understand why industries grow at different rates, it is necessary to examine factors affecting both the demand and supply of goods and services. In Section 2.7 a possible pattern of aggregate demand for the next decade was projected. One of the features of that projection was a substantial energy investment boom which generates demand for the products of goods-producing industries. On the other hand, an increasing proportion of personal expenditure was directed towards the products of the service industries. Since the economy is operating somewhat below the level of potential output; it is these demand factors that will determine the levels of output and employment in the various industrial divisions of the economy. Although bottlenecks may occur in particular industries, overall it appears that the economy will not be pushing against capacity constraints during this period.

To translate these output projections into employment projections, the various factors contributing to the production of goods and services must be examined. Changes in employment are affected by changes in the average hours worked per week, changes in the amount of capital equipment with which labour works, and technical change (such as innovations) which increases the amount of output that can be produced using a given amount of labour and capital. At an overall level, changes in total output also occur as resources are shifted from industries in which the ratio of output to the inputs of labour and capital is low to industries in which the ratio is high.

Most industries, except mining, show a downward trend in average hours worked per week over the past decade. If these trends continue,



and there is no reason to believe that this will not be the case, the tendency will be to increase employment. On the other hand, increases in the amount of capital equipment with which labour works will have the opposite effect. One of the likely results of the recent increases in energy prices, however, will be to reduce the ratio of capital to labour and thus offset to some extent any tendency to substitute capital for labour. Innovations and other forms of technical change tend to proceed somewhat unevenly and this makes it difficult to forecast their effect on employment. Moreover, the effect of technical change works in both directions since technical change tends to reduce costs and may lead to lower product prices and increased output. In the absence of other information, it will be assumed that technical change in the aggregate proceeds at its recent historical average rate (see p. 40).

Since it was not feasible to estimate the growth of net capital stocks in Ontario and to project the total inputs of labour and capital, it was assumed that average labour productivity (measured as output per personhour) continues to grow during the next decade at the average rate at which it grew during the past decade. In making this assumption, as the above discussion tried to indicate, there is an implicit assumption that the growth in the capital stock and the rate of technical change are such so as not to change this historical relationship between labour input and output. Moreover, it is assumed that changes in the mix of industries within broad industrial groups does not change in such a way as to affect productivity. To arrive at the commonly used productivity measure "output

per employee", the effect of the change in average hours worked must also be taken into account. Average hours worked per week were assumed to change at the same rate as in recent years.

As an aside some comments on short-run productivity measures and productivity growth seem in order. Short-run variations in average labour productivity occur during the business cycle because employment adjusts slowly to changes in output, partly because the changes in output are not fully anticipated and partly because employers prefer stability in the size of their work force. Hence, in a recession, such as in 1975, average labour productivity drops markedly and rises during the subsequent expansionary phase. These cyclical variations should not be confused with longer-term trends. Cyclical variations also affect unit labour cost measures, partly because of the variations in average labour productivity and partly because the rate of wage rate increase does not always immediately keep pace with the rate of increase in product prices. The catch-up of money wage rate changes to price changes is a cyclical phenomenon which should be taken into account in assessing the behaviour of real wage rates. It should also be pointed out that when a country's monetary costs of production become out of line with those of its trading partners, it is the foreign exchange rate, barring offsetting capital flows, that adjusts to maintain competitiveness.

With respect to long-run productivity growth, the major potentials for improvements lie in increasing the capital stock with which labour works and in increasing the rate of technical change through innovations.

In both cases, businesses must have incentives to make investments in capital goods and in research and development. They must be assured that it is profitable to do so. When the business climate is uncertain because of uncertainty about taxes, regulatory restrictions, incomes controls, and so forth, such investments are not likely to be made. Additions to capacity are made when expected profit margins ( the ratio of prices to total costs) are favourable.<sup>2</sup> In the current situation, in addition to the above-mentioned uncertainties, sharply increased energy costs and expenditures for pollution controls have also contributed to a reduction in profit margins. Once industries have adjusted to these latter increases in costs, the uncertainties become the main inhibiting factors to capital expansion.

### 6.3 GROWTH OF OUTPUT AND EMPLOYMENT

In Table 6.1 are presented the projections of the growth of output and employment in the Ontario economy over the next decade that are derived from the scenario for the growth of the national economy presented in Chapter Two.<sup>3</sup> The method used was to allocate shares of national output and employment to Ontario on the basis of recent shares. Table 6.1 also presents for commercial industries, as a crude measure of productivity growth, the growth in the ratio of output to the number of employees.

---

2 See Bosworth (1976) for a discussion of the factors affecting capacity creation in the steel, aluminum and paper industries in the United States.

3 The detailed projections for Canada are presented in Tables 2.14-2.15 and for Ontario in Tables 6.5-6.6.

TABLE 6.1

ONTARIO: GROWTH IN OUTPUT, EMPLOYMENT, AND PRODUCTIVITY<sup>1</sup>  
(Per Cent)

	From 1975 to 1977	From 1977 to 1982	From 1982 to 1987
<u>Total (all industries)</u>			
Output	4.0	4.8	3.8
Employment	2.2	2.4	2.0
<u>Goods Industries</u>			
Output	3.1	4.2	2.6
Employment	0.7	0.4	-0.9
Output per employee	2.4	3.8	3.5
<u>Resource Industries<sup>2</sup></u>			
Output	3.9	3.8	2.9
Employment	0.3	0.2	-0.2
Output per employee	3.6	3.6	3.2
<u>Manufacturing</u>			
Output	3.1	3.9	2.5
Employment	0.9	-0.1	-1.3
Output per employee	2.2	4.1	3.9
<u>Construction</u>			
Output	2.4	6.0	2.4
Employment	0.4	2.7	0.1
Output per employee	2.0	3.2	2.3
<u>Service Industries</u>			
Output	4.7	5.2	4.6
Employment	3.1	3.5	3.3

1 Output is defined as gross domestic product at factor cost and is measured in constant 1971 dollars. It is commonly referred to as real domestic product (RDP) at the national level and as real provincial product at the regional level. Growth rates are compound average annual percentage growth rates over the period.

2 Includes agriculture.

TABLE 6.1  
Continued

	<u>From 1975 to 1977</u>	<u>From 1977 to 1982</u>	<u>From 1982 to 1987</u>
<u>Commercial Service Industries</u> <sup>3</sup>			
Output	5.4	5.4	4.5
Employment	3.3	2.5	2.0
Output per employee	2.0	2.8	2.4
<u>Government Sector</u>			
Output	2.7	4.6	4.7
Employment	2.1	5.0	4.9
<u>Commercial Industries</u> <sup>3</sup>			
Output	4.2	4.8	3.6
Employment	2.0	1.5	0.7
Output per employee	2.1	3.2	2.8
<u>Noncommercial Industries</u> <sup>3</sup>			
Output	3.1	4.7	4.8
Employment	2.8	5.0	5.0

Source: Tables 6.5 and 6.6

<sup>3</sup> The definition of commercial industries follows that used by Statistics Canada. See footnote 20, p. 48.



A general feature of the growth pattern is the increase in growth rates in the 1977-82 period relative to 1975-77. As the energy investments occur, the economy picks up somewhat over the current slow rates of growth, but in general and as was pointed out in Chapter Two, the growth rates are lower than those of the latter part of the 1960s. Growth in the construction industry during this period is above average reflecting the investment boom. Growth in manufacturing is below average and employment in this sector of the economy is not expected to increase during this period since the growth in output and the growth in productivity are expected to be about the same. The service industries are expected to grow at above average rates and, in particular, the commercial service industries display relatively strong rates of growth. Given, however, the productivity growth occurring in the commercial service industry sector, the growth in employment is only moderate. In the non-commercial sector, output is measured by input and consequently productivity is by definition unity.<sup>4</sup> In this sector of the economy, therefore, the rates of increase in output and employment are very similar.

Turning to the period 1982-87, the rate of growth in output slows down as the energy investments taper off. The result is a substantial slowdown in the rate of growth of goods-producing industries and, if productivity growth continues at past rates, this will mean decreases in employment in manufacturing industries. The growth of service industries

---

4 Output in the noncommercial industries includes capital consumption allowances plus the input of labour services. This corresponds to the procedure used by Statistics Canada in the "System of National Accounts."

in this half of the decade is also affected, but not as severely as goods-producing industries. In part, this is because little change is assumed in the rate of growth of the government sector. The growth rate of commercial service industries declines moderately and is accompanied by a decrease in the rate of growth of employment.

#### 6.4 STRUCTURE OF INDUSTRY

The changes in the rates of growth of the different industrial sectors of the Ontario economy affect the relative proportions of the industries, as is shown in Table 6.2. The projections suggest that the proportion of output produced in the goods-producing industries in Ontario may decline from about 44% in 1975 to about 40% in 1987. This decline is expected to occur mainly in manufacturing for the reasons outlined above.<sup>5</sup> This decline in the relative importance of goods-producing industries is, of course, reflected in the increasing importance of service industries. The relative share of service industries may rise from its 1975 level of 56% to about 60% by 1987. This increasing importance of the service industries occurs almost entirely in the commercial service industry sector. This reflects a continuation of past trends leading to an increase in proportion of resources in the communication and transportation industry and in those industries contributing to supplying the demands resulting from the increased leisure time of the populace. Table 6.3 shows the

---

5 This is a lower proportion than in the TEIGA study. The difference may be partly due to the fact that TEIGA used an output measure which includes indirect taxes. These taxes are mainly on the output of manufacturing industries.

TABLE 6.2

ONTARIO: INDUSTRIAL DISTRIBUTION OF OUTPUT<sup>1</sup>  
(Per Cent)

	<u>1975</u>	<u>1977</u>	<u>1982</u>	<u>1987</u>
Goods Industries	44.1	43.3	42.1	39.8
Resource Industries	3.7	3.7	3.5	3.4
Manufacturing	31.9	31.3	30.2	28.5
Construction	6.0	5.8	6.1	5.7
Other	2.5	2.5	2.3	2.2
Service Industries	55.9	56.7	57.9	60.2
Commercial Services	38.9	40.0	41.2	42.8
Government Sector	14.3	14.0	13.9	14.4
Other	2.7	2.7	2.8	3.0
	100.0	100.0	100.0	100.0
Ontario output as a per cent of Canada total	40.2	40.1	40.0	39.9

<sup>1</sup> Real provincial product at factor cost.

Source: Table 6.5.

TABLE 6.3

ONTARIO: INDUSTRIAL DISTRIBUTION OF EMPLOYMENT  
(Per Cent)

	<u>1975</u>	<u>1977</u>	<u>1982</u>	<u>1987</u>
Goods Industries	37.2	36.1	32.6	28.2
Resource Industries	4.6	4.4	4.0	3.6
Manufacturing	25.6	25.0	22.0	18.6
Construction	6.3	6.1	6.1	5.6
Other	0.7	0.6	0.5	0.4
Service Industries	62.8	63.9	67.4	71.8
Commercial Services	38.3	39.1	39.3	39.3
Government Sector	18.9	18.8	21.3	24.5
Other	5.6	6.0	6.8	8.0
	100.0	100.0	100.0	100.0
Ontario employment as a per cent of Canada total	38.7	38.7	38.6	38.4

Source: Table 6.6

resulting industrial distribution of employment.

It is important to recognize that to a large extent this change in the industrial structure is in response to changes in the demand for goods and services. Real incomes have risen steadily on a per person basis since the end of the Great Depression of the 1930s and the Second World War apart from short-lived and minor recessions, not only in Canada but in most countries. As a result, the demand for those goods and services whose demand is strongly affected by increases in incomes have risen markedly. Moreover, rising educational levels, which in many respects have the same effects as an increase in income, have had similar effects. The net result is an increasing proportion of consumption expenditures being directed towards the products of the service industries, such as travel services, entertainment, recreation, and other activities associated with both increased amounts of leisure time and higher incomes. Adding to this trend towards increased growth of the service industries is an increased use by businesses of communications services, computer utilities, and business consulting services. To some extent, of course, the increased demand implies an increased demand for goods, especially in high technology areas such as television and computers. But it is here that technical change has been the greatest and where costs have decreased markedly. Hence, this demand does not lead to substantial increases in employment in the goods-producing industries.

There should not, therefore, be an overreaction to the relative



decline of the importance of goods-producing industries. This is an inevitable result of the growth of real incomes. It reflects the direction of consumer demands. It does not mean that goods-producing industries will not grow. It only means that service industries will grow more rapidly.

It is important to recognize that this relative increase in the importance of the service industries implies that new entrants into the labour force should be advised that it is in these industries that job opportunities are more likely to be found. This trend towards service industries will be modified during the latter part of the 1970s and early 1980s if the expected energy investments occur. This should not be allowed, however, to obscure the longer-term trend and its implications for job training.

## 6.5 UNEMPLOYMENT

In Chapter Three the rate of growth in the labour force was examined and a marked slowdown in its rate of growth was forecast. Despite this, however, in the latter part of the 1970s, it is expected that the labour force will grow more rapidly than will employment. Hence, some increase in the unemployment rate is expected to occur in this period (as can be seen in Table 6.4) unless there is a stimulus to aggregate demand which increases the rate of growth of employment. When the energy investments begin to have their impact in the economy, it is expected that the unemployment rate will decline somewhat in the mid-1980s. By the standards of the 1950s and 1960s, however, these unemployment

TABLE 6.4

## ONTARIO: POPULATION, LABOUR FORCE, EMPLOYMENT AND UNEMPLOYMENT

Levels and Per Cent of Canada Total<sup>1</sup>

	Population	Labour Force	Employment	Unemployment	Unemployment as per cent of labour force
	-----Thousands-----				
1975	8226 (36.1)	3861 (38.4)	3611 (38.7)	250 (35.2)	6.5
1976	8342 (36.1)	3943 (38.3)	3692 (38.6)	251 (34.2)	6.4
1977	8461 (36.2)	4051 (38.5)	3775 (38.8)	276 (35.0)	6.8
1978	8582 (36.2)	4149 (38.5)	3836 (38.7)	313 (35.8)	7.5
1979	8704 (36.2)	4236 (38.4)	3927 (38.7)	309 (34.5)	7.3
1980	8829 (36.3)	4337 (38.4)	4022 (38.7)	315 (34.9)	7.3
1981	8957 (36.3)	4439 (38.4)	4134 (38.7)	305 (35.0)	6.9
1982	9086 (36.3)	4545 (38.4)	4258 (38.6)	287 (35.2)	6.3
1983	9215 (36.4)	4642 (38.4)	4366 (38.6)	276 (35.4)	5.9
1984	9344 (36.4)	4739 (38.4)	4480 (38.6)	259 (35.4)	5.5
1985	9472 (36.4)	4825 (38.3)	4568 (38.5)	257 (34.8)	5.3
1986	9599 (36.4)	4902 (38.3)	4626 (38.5)	276 (34.8)	5.6
1987	9725 (36.5)	4990 (38.3)	4704 (38.4)	286 (35.8)	5.7

Source: Tables 3.6, 3.14, and 6.6.

- 1 The figures in parentheses are the percentages of the corresponding Canada totals. As indicated in the description of sources and methods, the population, labour force, and employment projections are each derived from different models.

rates are high. To some extent they reflect the increasing use of technology in the economy and the resultant requirement that, to obtain employment, workers must have a higher level of training. To reduce unemployment significantly below these levels will require both an increase in aggregate demand above that envisaged in the projection and specific training schemes for unemployed workers in order to qualify them for the available jobs, particularly in the service industries.

## 6.6 CONCLUSION

A number of points may be stated as a summary of the policy implications of this chapter.

- (i) The changing structure of industry reflects to a large extent changing consumer demands and should be adapted to, not resisted.
- (ii) Growth in the average productivity of labour should result from technical change and increased investments. This will occur if businesses anticipate that such actions will be profitable. Hence, uncertainty about taxation and regulation should be reduced as much as possible.
- (iii) Increased investments may achieve economies of scale where the size of the market can be expanded. This suggests that barriers to trade, both interprovincial and international, should be reduced. Insofar as economies of scale lead to concentration within industries, international competition,

in the absence of trade barriers, should protect the consumer from the exertion of market power by firms within such industries. Competition policy is, however, important in protecting the consumer in purely domestic industries.

- (iv) Increasingly, new job opportunities will exist (apart from the period of the energy investment boon) in the service industries.
- (v) Policies to ensure a level of aggregate demand which keeps the economy growing at its potential output growth rate are essential. In general, a policy which contributes to a steady stream of investment expenditures will contribute to this. Hence, there is a further reason to give business an environment in which the results of investment can be foreseen with some certainty.

Tables 6.5-6.6

Ontario: Real Output and Employment  
High-Price Energy

Based on Projections from  
TRACE MODEL Mk IVD  
Institute for Policy Analysis  
University of Toronto



TABLE 6.5  
ONTARIO : REAL PROVINCIAL PRODUCT BY INDUSTRY  
(MILLIONS OF 1971 DOLLARS)

	1975	1976	1977	1978	1979	1980	1981
AGRICULTURE, FISHING, & TRAPPING	593	599	608	617	627	636	646
FORESTRY	106	117	121	127	135	143	152
MINES, QUARRIES & OIL WELLS	746	806	831	866	909	953	1006
MANUFACTURING	12406	12932	13190	13585	14131	14613	15239
CONSTRUCTION	2314	2422	2428	2525	2659	2794	3019
ELECTRICAL POWER, GAS & WATER UTILITIES	977	1015	1040	1069	1104	1138	1178
TOTAL : GOODS INDUSTRIES	17142	17891	18218	18789	19565	20277	21240
COMMERCIAL SERVICE INDUSTRIES	15124	16107	16794	17600	18535	19456	20579
PERSONAL SECTOR	1040	1094	1151	1210	1273	1338	1407
GOVERNMENT SECTOR	5573	5696	5877	6140	6423	6720	7032
TOTAL : SERVICE INDUSTRIES	21737	22897	23822	24950	26231	27514	29018
TOTAL : ALL INDUSTRIES	38879	40788	42040	43739	45796	47791	50258

TABLE 6.5 (CONT.)

ONTARIO : REAL PROVINCIAL PRODUCT BY INDUSTRY  
(MILLIONS OF 1971 DOLLARS)

	1982	1983	1984	1985	1986	1987
AGRICULTURE, FISHING, & TRAPPING	655	665	675	685	696	706
FORESTRY	163	171	181	188	192	200
MINES, QUARRIES & OIL WELLS	1063	1111	1165	1202	1227	1269
MANUFACTURING	16003	16560	17263	17615	17708	18152
CONSTRUCTION	3249	3422	3676	3726	3582	3658
ELECTRICAL POWER, GAS & WATER UTILITIES	1225	1265	1311	1346	1375	1418
TOTAL : GOODS INDUSTRIES	22358	23194	24271	24762	24780	25403
COMMERCIAL SERVICE INDUSTRIES	21887	23013	24316	25315	26106	27316
PERSONAL SECTOR	1480	1556	1636	1719	1807	1900
GOVERNMENT SECTOR	7360	7704	8065	8445	8843	9262
TOTAL : SERVICE INDUSTRIES	30727	32273	34017	35479	36756	38478
TOTAL : ALL INDUSTRIES	53085	55467	58288	60241	61536	63881

TABLE 6.6

ONTARIO : EMPLOYMENT BY INDUSTRY  
(THOUSANDS)

	1975	1976	1977	1978	1979	1980	1981
AGRICULTURE, FISHING, & TRAPPING	124	124	124	124	124	124	124
FORESTRY	10	11	11	11	11	12	12
MINES, QUARRIES & OIL WELLS	33	34	33	33	33	33	34
MANUFACTURING	925	930	942	930	930	927	929
CONSTRUCTION	227	231	229	231	236	242	253
ELECTRICAL POWER, GAS & WATER UTILITIES	25	24	24	23	22	22	21
TOTAL : GOODS INDUSTRIES	1344	1354	1363	1352	1356	1360	1373
COMMERCIAL SERVICE INDUSTRIES	1383	1436	1477	1502	1539	1578	1623
PERSONAL SECTOR	203	214	225	237	250	263	276
GOVERNMENT SECTOR	681	688	710	745	782	821	862
TOTAL : SERVICE INDUSTRIES	2267	2338	2412	2484	2571	2662	2761
TOTAL : ALL INDUSTRIES	3611	3692	3775	3836	3927	4022	4134

TABLE 6.6 (CONT.)

ONTARIO : EMPLOYMENT BY INDUSTRY  
(THOUSANDS)

	1982	1983	1984	1985	1986	1987
AGRICULTURE, FISHING, & TRAPPING	124	124	124	124	124	124
FORESTRY	12	12	12	12	12	12
MINES, QUARRIES & OIL WELLS	34	34	34	33	33	32
MANUFACTURING	935	933	931	919	895	877
CONSTRUCTION	262	269	279	278	265	263
ELECTRICAL POWER, GAS & WATER UTILITIES	21	20	20	19	19	18
TOTAL : GOODS INDUSTRIES	1388	1392	1400	1385	1348	1326
COMMERCIAL SERVICE INDUSTRIES	1674	1718	1761	1798	1824	1851
PERSONAL SECTOR	291	306	322	339	356	375
GOVERNMENT SECTOR	905	950	997	1046	1098	1152
TOTAL : SERVICE INDUSTRIES	2870	2974	3080	3183	3278	3378
TOTAL : ALL INDUSTRIES	4258	4366	4480	4568	4626	4704





METHODOLOGY OF PROJECTING REAL PROVINCIAL  
PRODUCT AND EMPLOYMENT BY INDUSTRY

A6.1 INTRODUCTION

The method used was a two-stage procedure whereby the projections from the TRACE Model of expenditures by persons on consumer goods and services, by government on goods and services, by business on capital goods, and by non-residents on exports of Canadian goods and services were translated into real domestic product and employment by industry. The second stage was to allocate a share of national output and employment to Ontario. The principal advantage of the method is that the provincial projections automatically change in response to any change in the factors affecting the level or composition of aggregate demand at the national level. The principal disadvantage is that the method assumes that the only difference between the province and the national economy is the proportion in which the various industries are represented. That is, the relation between final expenditure and industry output and between input and output (productivity) is assumed to be the same at both the national and provincial level. The method is a general one and can be applied to any province. The sum of the provincial projections can be constrained to add to the national total (after allowing for any territories or provinces for which the necessary statistical data are not available).

## A6.2 CONVERSION OF FINAL EXPENDITURE INTO OUTPUT BY INDUSTRY

Table A6.1 is a converter matrix which translates the impact of a final expenditure of \$1,000,000 in a particular category (e.g. personal expenditure in consumer durable goods) into indirectly generated gross domestic product at factor cost (GDP) originating in each of eight industrial divisions into which the economy has been divided, directly generated GDP in the form of direct labour input, imports of goods and services (excl. income paid to non-residents), government revenue from production, and indirect taxes less subsidies. This converter matrix,  $A = [a_{ik}]$ , was generated by Statistics Canada<sup>1</sup> from two of the standard input-output matrices

$$A = B \cdot F$$

where  $B$  is a rectangular matrix showing in which industry each commodity is made,

$F$  is a rectangular matrix showing the commodity composition of each category of final expenditure. The matrices are for the year 1966 and are in 1966 dollars, 1966 being the latest year for which input-output matrices are available.<sup>2</sup>

Real domestic product (GDP in constant 1971 dollars) originating in each industry in a particular year was projected by multiplying the elements in each column of  $A$  (on a per dollar of final expenditure basis) by the

---

1 An adjustment was made to the original matrix to allocate "un-allocated" exports.

2 See Statistics Canada (13-505, 1976).

TABLE A6.1

1966 I-0 Model Open: GDP at Factor Cost by Industry and Other Primary Input per \$1 Million of Final Expenditure (1966)

Final Expenditure Category Industry or Primary Input Category	1	2	3	4	5	6	7	8	9	10
	Durable Consumer Goods (CD)	Semi- Durable Consumer Goods (CSD)	Non- Durable Consumer Goods (CND)	Consumer Services (CS)	Business F.C.F. Construction (IHB + IFNB)	Business F.C.F. Machinery & Equipment (IFMB)	Government F.C.F. Construction (IHG + IFNG)	Government F.C.F. Machinery & Equipment (IFMG)	Exports (Dom. & Re-ex.) (X-YIDXR)	Government Current Expend. (Net) (CG)
1. AGRICULTURE, FISHING AND TRAPPING	10485	13214	104921	11382	2333	2772	2391	2607	84731	5468
2. FORESTRY	2601	2945	3044	1654	7928	1533	4728	2194	26324	1124
3. MINES, QUARRIES & OIL WELLS	5239	5801	17125	3853	30975	7295	27972	6396	112342	5478
4. MANUFACTURING	224466	294713	214785	44195	202861	268748	213971	303152	284243	60810
5. CONSTRUCTION	5454	6362	10018	31950	344253	4299	377407	4226	11589	36331
6. ELECTRIC POWER, GAS & UTILITIES	8674	9922	47679	6099	6801	4995	7030	5094	15567	11078
7. OTHER COMMERCIAL INDUSTRIES	302435	324550	257883	567136	186746	170614	151601	142473	283274	90333
8. OTHER INDUSTRIES	7	9	5	51402	6	3	5	4	7	3056
9. DIRECT PRIMARY INPUT				73305						722377
10. IMPORTS (EXCL. DUTIES)	293343	200130	144702	47833	125107	395759	128323	402719	147709	73532
11. GOV. REV. FROM PROD.	2902	3998	3616	33998	2503	1899	2142	2040	3267	-37397
12. INDIRECT TAXES LESS SUBSIDIES	143880	138341	196175	127184	90467	142067	84414	111086	30944	27503
TOTAL	999989	999987	999958	999992	999983	999989	999986	999992	1000000	999694

Source: Estimated from computations provided by Statistics Canada

TRACE model's projection of a particular category of final expenditure and then summing across the rows of the derived matrix to obtain the estimate of total industry output. Thus,

$$VA(i,t) = a(i,1) * CD(t) + a(i,2) * CSD(t) \\ + \dots + a(i,10) * CG(t)$$

where  $VA(i,t)$  is GDP originating in the  $i$ th industry ( $i=1, \dots, 8$ ) in year  $t$

$CD(t)$ , etc., (see column headings of Table A6.1) are the levels of real expenditure on categories of final expenditure in year  $t$  as generated by the TRACE model.

If the method is extended to all rows of matrix  $A$ , the sum (subtracting row 10 (imports) instead of adding it) would be gross domestic product at market prices<sup>3</sup> (GDPM) less the domestically-produced content of the change in inventories (II-MII). That is,

$$GDPM = \sum_{i=1}^9 VA(i) + \sum_{i=11}^{12} VA(i) - VA(10) + (II - MII)$$

Ideally, matrix  $A$  for the year 1971 would have been desirable since the final expenditure projections are in constant 1971 dollars. If appropriate deflators had been available, the 1966  $A$  matrix would have been converted to 1971 dollars. In the absence of the deflators it has implicitly

- 
- 3 Column 9 (exports of the  $A$  matrix) excludes income received from abroad since the input-output matrix is on a domestic (rather than national) product basis.
- 4 The import content coefficient for inventory change was assumed to be 0.35. See Choudhry, Kotowitz, Sawyer and Winder (1972, p.59).

assumed that the implicit price indexes of all components of a column of the A matrix changed in the same proportion. No attempt was made to adjust the coefficients of the A matrix for changes in either the B or F matrix which may occur over time.<sup>5</sup> Thus, the coefficients of the A matrix were assumed to be constant in real terms over time.

The TRACE model projects GDP originating in four industrial divisions or sectors: agriculture, fishing, and trapping (VAA); commercial non-agricultural industries (VAN), corresponding to the sum of industries 2 to 7 in matrix A; the government sector (VAG); and the personal sector (VAP). All but VAN are exogenously projected for the TRACE model. Projections of the four TRACE sector GDP components can also be derived from the projection method described above. That is,

$$ZVAA = VA(1) + IIA - MIIA$$

where ZVAA denotes an estimate of VAA

IIA is inventories of farm products and grain in commercial channels

MIIA is the import content<sup>6</sup> of IIA

$$ZVAG = a(9,10) \cdot CG$$

$$ZVAP = VA(8) + a(9,4) \cdot CS$$

$$ZVAN = \sum_{i=2}^7 VA(i) + (IIN + IIG - MIIN - MIIG)$$

---

5 Some information on such changes in structure over time could be extracted from Statistics Canada (13-505, 1976). A method for adjusting input-output matrices for known changes in some coefficients is described in Matuszewski, Pitts, and Sawyer (1972).

6 An adjustment should also be made to subtract any indirect taxes included in the value of the change in inventories.



In the light of the results of the projections of ZVAA and ZVAP, some adjustment could be made to the original exogenous estimates of VAA and VAP to make them more consistent. The VA projections were then constrained to be consistent with the TRACE model projections.

$$VA(1) = VAA$$

$$VA(8) = VAP$$

$$VA(9) = VAG$$

The estimates of the components of VAN in 1973 were then compared with estimates of the actual components for that year.<sup>7</sup> It was observed that in industries 2 - 5 the shares were too high while they were too low in industries 6 and 7. This would seem to imply an increased use of domestically produced energy (industry 6) and an increase in the proportion of value added from the service industries (industry 7) relative to that of goods-producing industries. Hence the following error adjustment was made to the projections of industries 2 - 7 and the VA estimates for industries 2 - 7 calculated as follows:

$$VA(i) = VA(i) * (1 + EVA(i))^t * VAN /$$

$$[ZZVAN - (IIN + IIG - MIIN - MIIG)] + AVA(i)$$

where EVA(i) is an estimate of the annual compound proportionate error since the base year 1966 and AVA(i) is a constant adjustment

t is time (t = 0 in 1966)

$$ZZVAN \text{ is } \sum_{i=2}^7 VA(i) * [(1 + EVA(i))]^t$$

---

7 The year 1973, rather than 1975, was chosen because 1966 and 1973 seemed to be at the same phase of the business cycle. If resources had permitted, a regression analysis of the errors over the period 1966-74 could have been done to ascertain the trend of the error.

and the  $VA(i)$  on the right-hand refers to the original unadjusted projection of  $VA(i)$ .

The values of the EVA and AVA vectors are shown in Table A6.2.

### A6.3 EMPLOYMENT PROJECTIONS

The assumptions underlying the employment projections can be understood more clearly if a production function is specified to describe the technology used in each industry. Suppose there are constant returns to scale, neutral technical change which occurs at a constant rate,  $\gamma$ , over time, and constant elasticities of output (value added),  $q$ , with respect to the inputs of labour,  $n$ , (measured in manhours) and capital,  $k$ . That is, assume there is a Cobb-Douglas production function:

$$q_t = e^{\alpha+\gamma t} n_t^\beta k_t^{1-\beta}$$

Assume that over time the rental price of capital goods falls relative to the wage rate (that is labour becomes relatively scarce) so that the capital-to-labour input ratio rises at a constant rate over time. Then average labour productivity

$$\left(\frac{q}{n}\right)_t = e^{\alpha+\gamma t} [(1+\sigma)^t (k/n)_0]^{1-\beta}$$

where  $(k/n)_0$  is the capital-labour ratio in a base period

$\sigma$  is the growth rate in the capital-labour ratio.

Average labour productivity thus grows at a constant rate over time.<sup>8</sup>

---

8 The input-output coefficients used to derive Table A6.1 can be interpreted as implying constant ratios of value added to gross output. This is not necessarily inconsistent with assuming the relation of

TABLE A6.2

Coefficients used in computer calculations<sup>1</sup>

Industry	BMH	PR	H	HR	OS	EVA
1	0.6327	0.0346	49.91	-0.0015	0.248	0.0
2	0.2936	0.0501	40.89	-0.0115	0.158	0.0
3	0.1021	0.0414	37.98	0.0	0.211	0.0
4	0.2119	0.0381	37.87	-0.0023	0.536	-0.0084
5	0.1843	0.0248	39.50	-0.0054	0.347	0.0
6	0.0883	0.0565	44.58	-0.0037	0.349	0.0
7	0.2031	0.0291	38.40	-0.0087	0.384	0.0060
8					0.367	
9					0.378	
	AVA	AL	AOVA	AOL <sup>2</sup>		
1	0.0	0.0	0.0	0.0		
2	-0.200	-3	0.0	0.0		
3	-0.070	-10	0.0	+8		
4	0.0	-22	+800	-20		
5	-0.900	0.0	0.0	+40		
6	+0.800	0.0	0.0	0.0		
7	+0.370	+35	-555	-58		
8	0.0	0.0	-40	-12		
9	0.0	0.0	-205	-35		

1 Units of measurement are in accordance with the computer program used to generate the results.

2 For the years 1975-76, AOL for industry 4 was -39.

The manhours required to produce a given level of output can therefore be expressed as

$$n_t = m_0 \cdot q_t (1 + \lambda)^t$$

where  $m_0$  is the manhours required to produce a unit of output in the base period,

$\lambda$  is the composite growth rate which includes the effects of both technical change and capital-labour substitution.

Using the mnemonics used for variable names in the TRACE model and the industry allocation sub-model described in the preceding section, this can be written as

$$HM(i, t) = BMH(i) * VA(i, t) / (1 + PR(i))^t$$

where  $HM(i, t)$  is manhours (in millions) employed in the  $i$ th industry in year  $t$

$BMH(i)$  is manhours employed per unit of output in the base year ( $t = 0$ )

$PR(i)$  is the average annual rate of growth in productivity (average output per manhour)

$t$  is time ( $t = 0$  in 1966)

To convert to employment estimates, adjustment must be made for hours worked per week

$$L(i, t) = HM(i, t) / H(i) / (1 + HR(i))^t / .052 + AL(i)$$

---

inputs of labour and capital to value added are described by a Cobb-Douglas production function. The error correction in section 6.2 (the EVA vector) can be explained by technical changes which affect the substitution of intermediate goods (including import substitution) and by relative price changes reflecting changes in the cost factors.

where  $L(i, t)$  is number of persons (in thousands) employed in the  $i$  th industry in year  $t$

$H(i)$  is the average hours worked per week in the  $i$  th industry in the base year

$HR(i)$  is the average annual rate of change in hours worked per week.

$AL(i)$  is a constant adjustment to the level similar to  $AVA(i)$ .

The source of data for estimating the  $BMH$ ,  $PR$ ,  $H$  and  $HR$  vectors was Statistics Canada (14-201, 1976).<sup>9</sup> The  $VA$  vector was obtained from Statistics Canada (61-202, 1975).<sup>10</sup>  $BMH$  and  $H$  values were calculated as the average over the period 1965-67 for each of the industries 1 - 7 (the commercial industries).  $PR$  and  $HR$  values were calculated as the average compound rate of growth over the period 1964-74. Table A6.2 gives the values of these vectors.

A similar procedure to that described for the  $VA(i)$  estimates was used to constrain the totals for the four production sectors in the TRACE model to be identical with the employment projections in the TRACE model.

#### A6.4 ONTARIO OUTPUT AND EMPLOYMENT PROJECTIONS

The projections of real provincial product and employment for Ontario were done by applying "share coefficients" to the national projections. For goods-producing industries, the shares were the average 1964-72 ratios of

---

9 Some unpublished details were provided by Statistics Canada.

10 The 1961 indexes were mechanically converted to 1971 = 1.0.



value added in Ontario industries to the Canada totals.<sup>11</sup> These were calculated from Statistics Canada (61-202, 1975). Although slight trends appeared in some of these ratios they were not clear enough to justify the use of a non-constant share. For service industries, the share was based on the ratios of employment in Ontario to Canada total for each industrial division or sector. The shares were based on the average shares for 1964-74 calculated from Statistics Canada (72-514, 1976).

These share coefficients,  $OS(i)$ , were applied to both  $VA(i)$  and to  $L(i)$  to obtain estimates of Ontario output and employment. The  $OS$  vector is shown in Table A6.2. Constant add factors were used to adjust the levels of output and employment where necessary to produce rough agreement with recent historical data.<sup>12</sup> These are shown in Table A6.2 as  $AOVA$  and  $AOL$ .

#### A6.5 ALTERNATIVE METHODOLOGIES

An alternative model for generating industrial output and employment projections at the national level is CANDIDE and, at the provincial level, CANDIDE-R. The method used in CANDIDE (see McCracken, 1973) is somewhat similar to that used in the present study in that both methods use input-output matrices to convert final expenditures into value added by industries.

---

11 These "value added" ratios include inputs of non-factor services.

12 The AOL adjustment of -20 for 1977 onward for industry 4 was decided upon after examining the labour force projection. Prior to this the value of AOL was -39. This was the only adjustment for consistency with the labour force projections.

A set of adjustment equations are used to compensate for errors instead of the EVA, AVA, and AL vectors used in this study. At the regional level (see Regional Economic Expansion CANDIDE-R, Working Paper No. 6, 1975) a share distribution model incorporating a partial adjustment mechanism is used.<sup>13</sup> The shares are a function of the relative degree of utilization of accumulated capacity. This is obviously a more satisfactory method than using the constant OS vector of this study (modified by the AOVA and AOL error vectors). It requires, however, the projection of investment by industry,<sup>14</sup> a task which was not considered feasible with the resources available for this study.

The method of shift-and-share analysis has been used by Martin (1976) to allocate employment at the national level to regions during the period 1961-70. The method, however useful it may be for some purposes, does not seem to make use of available evidence on different productivity growth rates of different industries and the different rates at which average hours worked per week change. These factors, when related to the share of regions in specific industry groups, seem to be an important factor in explaining a region's capability to provide employment.

---

13 In the method used in this chapter, the partial adjustment occurs at the national level in the TRACE model.

14 Statistics on investment expenditures by province by industrial division are published in Statistics Canada (61-205, 1976).

SOME ALTERNATIVE PROJECTIONS

by

John A. Sawyer and John W.L. Winder

7.1 A LOW-PRICE ENERGY SCENARIO

Partly in order to indicate the conditional nature of the projections in Chapters Two to Six and partly to indicate the effect of the particular energy investment scenario used in those chapters, an alternative projection based on the "low-price energy scenario" of An Energy Strategy for Canada is presented in this section.

The low-price scenario of An Energy Strategy (pp. 48-9) assumes that the controlled price of oil remains at end of 1975 levels in constant dollars. It increases only at the general rate of inflation and does not increase relative to the prices of other goods and services. It is further assumed that the price of natural gas increases to "commodity equivalent" value with crude oil (\$1.52/mcf at the Toronto City-gate in 1975 dollars) in the latter part of the 1970s, and that the prices for electricity and coal also remain constant, in real terms, at year-end-1975 levels.

These lower prices increase energy demands by about half a percentage point a year (Strategy, p.50). Moreover, the lower prices lead to less domestic investment, particularly in gas and oil facilities, and a larger

gap between domestic supplies and demand than in the high-price scenario (Strategy, pp. 73-91). Hence, there are lower investments and larger imports. Moreover, in the low-price scenario, a much higher projection of the investments are in electric power (75 per cent) than in the high-price scenario (50 per cent). (Strategy, p. 108). The energy shortfalls in the low-price scenario could amount to about 11 per cent of estimated total requirement in 1980, increasing to 20 per cent by 1985 (Strategy, p. 79). If these shortfalls are not satisfied by imports, rationing might be necessary.

Table 7.1 shows the energy investments over the period 1978-87 that are associated with this alternative projection.<sup>1</sup> (For purposes of the comparison of the conditional projections of Chapters Two and Seven, it was assumed the energy investment, imports, and exports were identical through the current year, 1977).

#### 7.1.1 Effects on the National Economy

The differences in the impact on the Canadian economy of the two energy scenarios result from the three major differences in the scenarios. The first is that in the short run, the low-price energy scenario has a stimulative effect on the economy because the lower energy prices do not inhibit nonenergy investment as much as do the higher prices.<sup>2</sup>

---

1 Table 7.1 is comparable with Table A2.2 on p. 77.

2 This stimulative effect has been artificially imposed on the projection by allowing energy investment to be higher in 1978 in the low-price projection.

TABLE 7.1

## ESTIMATED ENERGY-RELATED CAPITAL REQUIREMENTS, 1978-1987

## Low-price Scenario

	<u>Endogenously Generated</u>	<u>Exogenous Addition</u>	<u>Total</u>	<u>Proportion of Gross National Product</u>
	-	billions of 1971 dollars	-	per cent
1978	3.74	2.41	6.15	4.8
1979	4.04	2.61	6.65	5.0
1980	4.34	2.79	7.13	5.1
1981	4.57	2.94	7.51	5.2
1982	4.73	3.05	7.78	5.1
1983	4.83	3.12	7.95	5.0
1984	5.12	3.30	8.42	5.1
1985	5.46	3.52	8.98	5.2
1986	5.55	3.57	9.12	5.0
1987	5.83	3.75	9.58	5.0
Total:	48.21	31.06	79.27	

Source: Calculations by the Institute for Policy Analysis.

The second is that the high-price energy scenario has higher investments in the period 1981-85.<sup>3</sup> This investment boom imparts a cyclical character to the course of the economy with a resultant slowdown in economic growth in 1986-87. This cyclical effect could be offset by shifting the timing of some of the investments and/or adopting a compensatory monetary-fiscal policy. The third is that the absence of this higher level of investment in the low-price energy scenario leads to a gap between the demand for energy

---

3 It must be remembered that this timing is only approximate and is based on information available to the Ministry of Energy, Mines, and Resources in early 1976 and published in Strategy.



and domestic availability which begins to grow markedly in 1985. Thus, the current account deficit will grow markedly if these excess demands are satisfied by imports of high-price petroleum. This will lead to a sharp depreciation of the foreign exchange rate. These differences will be explained in more detail in subsequent paragraphs.

As Table 7.2 indicates, the short-run economic outlook is somewhat better under the low-price energy scenario. Both real GNP and employment are higher. By 1980, however, this expansionary effect on real output has disappeared. Since employment adjusts with a lag, the effect on employment does not disappear until a year later.

TABLE 7.2  
MACROECONOMIC EFFECTS<sup>4</sup> OF LOW-PRICE ENERGY: CANADA

	<u>Real Gross National Product</u>	<u>GNP Price Index</u>	<u>Employment</u>
	(per cent)		
1978	1.5	0.4	0.7
1979	0.3	0.3	0.4
1980	0.0	0.9	0.4
1981	-0.8	0.7	0.0
1982	-0.7	0.9	-0.1
1983	-1.3	1.2	-0.4
1984	-2.4	1.3	-1.0
1985	-1.4	1.7	-0.8
1986	0.4	2.8	0.1
1987	1.0	5.0	0.6

Source: TRACE model simulation results

<sup>4</sup> Low-price energy projection minus high-price energy projection as a per cent of the latter. Table 7.8 at the end of the section presents a summary of the projection which may be compared with Table 2.10.

This stimulus to the economy has, however, two side effects. The rate of inflation is higher and the exchange rate depreciates. The two effects are not unrelated, of course, since the one reinforces the other. The exchange rate depreciation, since it makes imports more expensive, tends to increase domestic output and employment in the short run. On the other hand, it makes goods and services more expensive and in the long run, because of this effect, most of the expansionary effect disappears.

Turning to the middle part of the projection period (1981-85), the difference is, in large part, the slicing off of the peak of the investment boom, and the transference of much of it to the late 1980s. Thus, the low-price energy scenario is smooth whereas the high-price one has a pronounced cycle. The levels of real GNP and employment are, therefore, lower during this period in the low-price energy scenario. This lowers the induced demand for imported goods and, by itself, would tend to appreciate the exchange rate. There is, however, a lower level of capital flows associated with the lower energy investment. This, coupled with the higher price levels which persist from the earlier years, results in a continuation of the lower external value of the Canadian dollar. Hence (see Table 7.3), the exchange rate is about 2 per cent lower in value in the low-price scenario relative to the rate in the high-price scenario up to 1984.

In the latter part of the projection period (1985-87), imports of fuels increase markedly in the low-price scenario and exports decrease. This occurs despite the fact that there are substantial investments in electric power occurring in the low-price scenario. The deterioration of

TABLE 7.3

BALANCE-OF-PAYMENTS EFFECTS<sup>5</sup> OF LOW-PRICE ENERGY: CANADA

	<u>Imports of Fuels</u>	<u>Exports of Fuels</u>	<u>Current Account</u>	<u>Capital Account</u>	<u>Exchange Rate<sup>6</sup></u>
	-	billions of current dollars		-	dollars
1978	-0.10	-0.16	0.09	0.10	0.02
1979	0.10	0.10	-0.10	-0.24	0.01
1980	0.15	-0.17	0.09	-0.17	0.02
1981	0.00	-0.38	-0.17	-0.05	0.01
1982	-0.05	-0.26	0.56	-0.56	0.02
1983	0.38	-0.43	0.57	-0.72	0.02
1984	0.83	-0.79	0.66	-0.82	0.01
1985	1.24	-1.17	0.30	-0.32	0.03
1986	3.61	-1.52	-3.37	2.92	0.05
1987	6.76	-1.70	-6.21	4.90	0.09

Source: TRACE model simulation results

the current account of the balance of payments leads to a sharp depreciation in the external value of the Canadian dollar. This increases the inflationary tendencies in the Canadian economy and by 1987 the GNP price index is 5 per cent above the level in the high-price scenario. Real output is also higher, partly as a result of the stimulus of the devaluation of the dollar and partly as a result of the investments in electric power.

---

5 Low-price energy projection less high-price energy projection.

6 Canadian dollars per U.S. dollar. A positive amount means a devaluation of the Canadian dollar relative to the high-price energy projection.

It is not easy to speculate on what might happen beyond 1987 in the low-price scenario. Undoubtedly the depreciation of the exchange rate will result in further increases in domestic prices. The increasing cost of imported fuels (as a result of the depreciation of the exchange rate) will make it harder to maintain low domestic energy prices. Perhaps the main effect would be the postponement of high energy prices for a decade at the cost of higher general price levels through the 1980s as a result of the lower external value of the Canadian dollar.

#### 7.1.2 Effects on Ontario Output and Employment

Although the different industrial divisions are represented in Ontario in different proportions than in the national economy, the overall effects on real output and employment do not differ from those shown in Table 7.2. Table 7.4 shows the effects for Ontario for the goods-producing and commercial service industries.<sup>7</sup> For both of these industrial divisions, output is lower in the 1981-85 period in the low-price energy scenario.

So far as Ontario government revenues and expenditures are concerned, the primary economic determinants are Ontario personal income, personal income and gross product (in current dollars). In the low-price scenario, the growth rates of all three are higher throughout the decade to 1987. The respective increments in average annual growth rates are 0.3, 0.3 and 0.2

---

<sup>7</sup> In the projections from the TRACE model, it was assumed that the differences in energy prices affected output and employment only in the commercial nonagricultural industries.

TABLE 7.4

EFFECTS<sup>8</sup> ON ONTARIO OUTPUT AND EMPLOYMENT OF LOW-PRICE ENERGY

	Goods-producing Industries		Commercial Service Industries		Total Commerical Industries	
	<u>Output</u>	<u>Employment</u>	<u>Output</u>	<u>Employment</u>	<u>Output</u>	<u>Employment</u>
	(per cent)					
1978	2.1	1.3	1.6	0.7	1.9	1.0
1979	0.4	0.4	0.5	0.6	0.4	0.5
1980	0.3	0.3	0.9	0.8	0.6	0.6
1981	-0.7	-0.5	0.1	0.4	-0.4	0.0
1982	-0.8	-0.7	0.2	0.4	-0.4	-0.1
1983	-1.0	-1.4	-0.4	0.1	-0.7	-0.6
1984	-3.5	-2.6	-0.7	-0.5	-2.6	-1.5
1985	-2.0	-1.2	-0.7	-0.5	-1.3	-0.8
1986	1.1	0.2	1.1	0.1	1.1	0.2
1987	2.2	1.4	1.7	0.7	1.9	1.0

Source: TRACE model simulation results

per cent for the first half of the decade and 1.4, 1.3 and 1.2 per cent for the last half of the decade.

### 7.1.3 Effects on Ontario Government Revenue and Expenditure

Personal income and gross provincial product directly affect revenue categories in the estimated equations used for projections. Consequently, average annual rates of growth of revenues are higher, by 0.2 per cent for

---

<sup>8</sup> Low-price energy projection less high-price energy projection as a per cent of the latter.



the first half and by 1.3 per cent for the last half of the decade to 1987. Average annual rates of growth of expenditures are also somewhat higher, inasmuch as personal disposable income directly affects so many expenditure categories in the estimating equations. The increments to growth rates are 0.2 per cent and 0.9 per cent for the first and second halves of the decade to 1987 respectively.

The implications of these changes in growth rates of Ontario government revenues and expenditures for net cash requirements on the Province's own account should perhaps first be stated in corresponding terms. For the first half of the decade to 1987, the average annual rate of growth in net cash requirements is higher by 0.4 per cent. But for the last half of the decade to 1987, the average annual rate of growth in net cash requirements is lower by 0.8 per cent. To express it in other terms, the share of total expenditure projected to be financed by borrowing is 17.6 per cent in 1982 and 23.0 per cent in 1987 under the low-price scenario, compared to 17.4 per cent and 24.5 per cent respectively under the high-price scenario. The situation is on average therefore marginally worse under the low-price scenario to 1982, but better thereafter. However, as Table 7.5 indicates, these increments to average annual rates of growth do not tell the whole story because the pattern within each half of the decade to 1987 is so variable.

Projected net cash requirements are lower under the low-price scenario only for the first and last two or three years of the decade. This reflects the difference in level of economic activity between the two

TABLE 7.5

REVENUE-EXPENDITURE EFFECTS<sup>9</sup> OF LOW-PRICE ENERGY: ONTARIO  
(per cent)

	<u>Total Revenue</u>	<u>Total Expenditures</u>	<u>Net Cash Requirements</u>
1978	2.3	1.0	-5.6
1979	1.0	0.7	-0.7
1980	1.6	1.2	-0.5
1981	0.5	0.7	1.8
1982	0.7	0.9	1.9
1983	0.3	0.8	3.1
1984	-0.9	0.3	4.9
1985	0.7	0.8	1.4
1986	3.9	2.4	-2.4
1987	6.9	4.9	-1.5

Source: Tables 5.4, 5.6 and TRACE model data.

scenarios. Smoothing out of the capital expenditures profile under the low-price scenario is reflected via a lower level of economic activity during the intermediate years in an aggravated financing problem for the Provincial government.

As Tables 7.6 and 7.7 reveal, the distribution of effects differs marginally across categories of revenues or expenditures. The effects on total expenditures are almost exactly the same as those on health expenditures. All expenditure categories join in the relative surge during the

---

<sup>9</sup> Low-price energy projection minus high-price energy projection as a per cent of the latter.

TABLE 7.6

DISTRIBUTION OF EXPENDITURE EFFECTS<sup>10</sup> OF LOW-PRICE ENERGY: ONTARIO  
(per cent)

	<u>1978</u>	<u>1981</u>	<u>1984</u>	<u>1987</u>
Health	1.0	0.9	0.4	4.7
Education	0.6	0.9	0.8	4.6
Treasury, Economics and Intergovernmental Affairs	1.0	1.3	0.6	4.3
Transportation and Communications	0.3	0.7	1.2	5.0
Community and Social Services	0.6	0.8	0.9	4.0
Public Debt - Interest	1.3	0.9	0.1	4.7
All Other	1.9	-0.1	-1.2	6.2
<hr/>				
Total	1.0	0.7	0.3	4.9

Source: Table 5.6 and TRACE model data.

last two years of the projection period during what would, under the high-price energy scenario, be a period of slack economic activity. All revenue categories are relatively more robust in these last two years under the low-price scenario as well. The least responsive overall are OHIP premiums and vehicle registration fees, which reflect only changes in the level

---

<sup>10</sup> Low-price energy projection minus high-price energy projection as a per cent of the latter.

TABLE 7.7

DISTRIBUTION OF REVENUE EFFECTS OF LOW-PRICE ENERGY: ONTARIO  
(per cent)

	<u>1978</u>	<u>1981</u>	<u>1984</u>	<u>1986</u>
Personal Income Tax	1.8	0.9	0.4	5.8
Corporation Income Tax	5.4	-0.6	-5.1	11.9
Retail Sales Tax	1.9	1.5	1.1	8.1
Motive Fuel Tax	1.3	0.3	-1.0	0.3
Other Taxation	2.5	-0.1	-1.4	7.4
<hr/> Total Taxation Revenue	<hr/> 2.5	<hr/> 0.6	<hr/> -0.9	<hr/> 7.6
OHIP Premiums	0.7	0.0	-1.0	0.7
LCBO Profits	1.7	1.3	0.8	7.4
Motor Vehicle Licences & Permits	1.2	0.3	-1.0	0.3
Other Fees & Licences	1.6	1.3	0.9	7.3
Miscellaneous Other Revenue	2.1	-0.1	-1.2	6.5
<hr/> Total Other Revenue	<hr/> 1.3	<hr/> -0.4	<hr/> -0.5	<hr/> 4.4
Payments from the Federal Government	1.9	0.5	-0.7	6.1
Interest on Investment	2.1	-0.1	-1.2	6.5
<hr/> Total Budgetary Revenue	<hr/> 2.2	<hr/> 0.5	<hr/> -0.8	<hr/> 6.8
Total Non-Budgetary Revenue	3.4	-0.1	-1.6	8.1
<hr/> Total Revenue	<hr/> 2.3	<hr/> 0.5	<hr/> -0.9	<hr/> 6.9

Source: Table 5.4 and TRACE model data.

of employment between scenarios. The relative changes in total revenues mirror those in total taxation revenues, with the exception of the last two years during which the increments attributable to the low-price scenario for the latter exceed those for the former because of the impact on the corporate income tax.

The responsiveness of total expenditures to changes in personal disposable income is readily apparent in most years even though changes in expenditures reflect changes in other determinants as well. On average, a one per cent increase in personal disposable income is associated with a 0.55 per cent increase in total expenditures over the decade, with values lying between 0.5 and 0.6 per cent in all but two years.

The determinants of total revenues, on the other hand, are too diverse for any such stable responsiveness to be apparent in relation to personal income or gross provincial product. On average a one per cent increase in personal income is associated with an increase of 0.9 per cent in total revenues, and a one per cent increase in gross provincial product with an increase of 1.2 per cent in total revenues. But in each case there is much variability about the average, reflecting the diverse range of additional determinants of revenues.



TABLE 7.8  
LOW-PRICE ENERGY  
SUMMARY OF PROJECTION

	1978	1979	1980	1981	1982	1983
PERCENTAGE RATES OF GROWTH						
GNP IN CURRENT DOLLARS	12.8	9.0	9.8	8.4	9.9	8.8
GNP IN CONSTANT (1971) DOLLARS	5.8	3.7	4.6	4.4	5.6	4.1
IMPLICIT PRICE INDEX OF GNP	6.6	5.1	5.0	3.8	4.1	4.6
PERSONAL EXPENDITURE ON CONSUMER GOODS & SERVICES IN CONSTANT DOLLARS	4.7	3.6	3.9	3.9	4.5	4.1
GOVERNMENT EXPENDITURE ON GOODS & SERVICES IN CONSTANT DOLLARS*	4.5	4.6	5.1	4.9	4.9	4.9
BUSINESS FIXED CAPITAL FORMATION IN CONSTANT DOLLARS	9.1	4.4	3.2	6.0	8.7	3.3
EXPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	4.9	5.1	5.2	4.9	4.9	4.4
IMPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	3.8	5.4	2.8	5.3	4.6	4.4
WAGE RATES IN BUSINESS NON AGRICULTURE	8.3	7.0	7.0	5.9	6.4	7.4
NORMAL UNIT LABOUR COSTS IN BUSINESS NON AGRICULTURE	5.3	3.8	3.7	2.7	3.1	3.7

\* EXOGENOUS

TABLE 7.8 (CONT.)

## LOW-PRICE ENERGY

## SUMMARY OF PROJECTION (CONT.)

	1984	1985	1986	1987
PERCENTAGE RATES OF GROWTH				
GNP IN CURRENT DOLLARS	8.6	9.9	10.3	11.3
GNP IN CONSTANT (1971) DOLLARS	4.0	4.7	4.4	4.5
IMPLICIT PRICE INDEX OF GNP	4.4	5.0	5.7	6.5
PERSONAL EXPENDITURE ON CONSUMER GOODS & SERVICES IN CONSTANT DOLLARS	4.0	4.3	4.2	4.3
GOVERNMENT EXPENDITURE ON GOODS & SERVICES IN CONSTANT DOLLARS*	4.9	5.0	5.0	5.0
BUSINESS FIXED CAPITAL FORMATION IN CONSTANT DOLLARS	4.5	5.1	4.3	4.8
EXPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	4.1	4.2	4.1	3.5
IMPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	5.2	3.9	4.1	3.7
WAGE RATES IN BUSINESS NON AGRICULTURE	7.2	7.7	8.4	9.2
NORMAL UNIT LABOUR COSTS IN BUSINESS NON AGRICULTURE	3.5	4.1	4.7	5.4

\* EXOGENOUS

TABLE 7.8 (CONT.)

## LOW-PRICE ENERGY

## SUMMARY OF PROJECTION (CONT.)

	1978	1979	1980	1981	1982	1983
	PER CENT					
UNEMPLOYMENT RATE	7.73	7.94	7.84	7.60	7.03	6.80
UTILISATION RATE	92.2	91.5	91.8	92.1	93.4	93.2
CANADA TREASURY BILLS (3 MONTHS)	6.60	6.21	5.34	5.25	4.94	5.31
GOVT. OF CANADA BONDS (10 YEARS & OVER)	8.28	8.47	8.54	7.96	7.53	7.57
PERSONAL SAVING RATE	9.05	8.65	8.45	8.14	8.25	7.86
	CANADIAN \$ PER U.S. \$					
FOREIGN EXCHANGE RATE	1.02	1.01	1.02	1.01	1.02	1.02
	BILLIONS OF DOLLARS					
CHANGE IN OFFICIAL INTERNATIONAL RESERVES	-0.18	0.09	0.08	0.03	0.02	0.08
CURRENT ACCOUNT BALANCE OF INTERNATIONAL PAYMENTS	-3.21	-3.15	-1.79	-1.84	-1.52	-1.79
GOVERNMENT SURPLUS OR DEFICIT	-0.34	-1.29	-1.25	-1.78	-0.68	-0.96

\* EXOGENOUS

TABLE 7.8 (CONT.)

## LOW-PRICE ENERGY

## SUMMARY OF PROJECTION (CONT.)

	1984	1985	1986	1987
	PER CENT			
UNEMPLOYMENT RATE	6.64	6.38	6.10	5.70
UTILISATION RATE	93.2	93.7	94.1	94.7
CANADA TREASURY BILLS (3 MONTHS)	5.43	5.50	5.80	6.13
GOVT. OF CANADA BONDS (10 YEARS & OVER)	7.51	7.54	7.75	8.14
PERSONAL SAVING RATE	7.41	7.21	6.94	6.76
	CANADIAN \$ PER U.S. \$			
FOREIGN EXCHANGE RATE	1.01	1.03	1.05	1.09
	BILLIONS OF DOLLARS			
CHANGE IN OFFICIAL INTERNATIONAL RESERVES	-0.05	0.01	-0.01	-0.00
CURRENT ACCOUNT BALANCE OF INTERNATIONAL PAYMENTS	-3.11	-3.42	-4.36	-5.76
GOVERNMENT SURPLUS OR DEFICIT	-1.83	-1.57	-1.92	-2.58

\* EXOGENOUS

## 7.2 THE EFFECT OF A TAX CUT

Since the main projection (the high-price energy scenario) showed a tendency towards inadequate aggregate demand and higher than normal unemployment rates, the effects of a tax cut were examined. A reduction in total personal income tax revenues (federal and provincial) which amounted to 8 per cent of the revenues from this tax in the high-price scenario (before allowing for the induced effects of the tax cut) was made in the TRACE model beginning in 1978.<sup>11</sup> The same percentage reduction in personal income tax revenues was also made in the Ontario submodel.

### 7.2.1. Effects on the National Economy

Table 7.9 shows the impact on the national economy of the tax cut. The stimulative effect shows up in increases in both real output (GNP) and employment. The effect on the unemployment rate is, however, not as great since the increase in incomes and the encouragement effect to seeking employment lead to an increase in the labour force.<sup>12</sup> As is often the case, undesirable side effects also appear. The level of prices is higher than in the absence of the tax cut and, partly because of this, the exchange rate depreciates. This depreciation of the exchange rate reinforces, however, the stimulative effect of the tax cut since it makes imports more expensive

---

11 The TRACE model is not well-suited to dealing with tax policies to stimulate investment; hence, the personal income tax was chosen as the stimulative policy instrument.

12 The labour force equations in the TRACE model are similar to those for Ontario described in Appendix 3.3.



and increases profit margins on exports sold in foreign currencies.

It should be noted that, in conjunction with the tax cut, the money supply was allowed to increase so that the effect of the increased demand for funds on interest rates was mitigated. Consequently, the increase in investment expenditures is greater than if the money supply had not been allowed to increase.

TABLE 7.9  
MACROECONOMIC EFFECTS<sup>13</sup> OF AN 8 PER CENT CUT IN  
PERSONAL INCOME TAX: CANADA

	Real Gross National Product	GNP Price Index	Employment	Labour Force	Exchange Rate <sup>14</sup>
		(per cent)			(dollars)
1978	0.71	0.17	0.35	0.28	0.02
1979	0.69	0.17	0.49	0.39	0.01
1980	0.84	0.35	0.61	0.44	0.02
1981	0.86	0.46	0.65	0.46	0.02
1982	0.97	0.64	0.72	0.50	0.02
1983	1.00	0.84	0.76	0.53	0.02
1984	1.06	1.07	0.81	0.56	0.03
1985	1.15	1.32	0.87	0.59	0.03
1986	1.28	1.65	0.95	0.64	0.03
1987	1.36	2.01	1.03	0.69	0.03

Source: TRACE model simulation results

13 Tax cut projection less high-energy price projection as a per cent of the latter.

14 Canadian dollars per U.S. dollar. A positive amount means a devaluation of the Canadian dollar relative to the high-price energy projection.

Table 7.10 shows the effects of the income tax cut on the combined federal, provincial, and local government revenues and expenditures. The increase in the level of economic activity induced by the tax cut generates higher incomes so that the actual decrease in personal income tax revenues is not as great as would otherwise be the case. Moreover, revenue from corporate income taxes, sales taxes, etc. also increase to offset further the initial loss in income tax revenues. Indeed, by the end of the decade, the induced increase in tax revenues offsets the amount of the tax cut so that revenues are left approximately unchanged. The induced increase in prices and wage rates, however, increases government outlays in the long run so that expenditures increase, resulting in a change in the combined deficit of all levels of governments which is largely attributable to this effect. Note that in the short run, government expenditure falls, reflecting, in the main, decreases in unemployment insurance payments.

TABLE 7.10  
PUBLIC FINANCE EFFECTS<sup>15</sup> OF AN 8 PER CENT CUT IN  
PERSONAL INCOME TAX: CANADA

	Personal Income Tax Revenue	Corporate Income Tax Revenue	Total Government Revenue	Total Government Expenditure (current account)	Increase in Government Deficit
		(per cent)			(billions of dollars)
1978	-7.35	2.80	-1.55	-0.06	1.35
1979	-7.45	2.47	-1.59	-0.07	1.50
1980	-7.08	3.14	-1.31	-0.02	1.40
1981	-7.03	3.21	-1.23	0.05	1.53
1982	-6.74	3.80	-1.01	0.15	1.52
1983	-6.52	4.09	-0.86	0.30	1.65
1984	-6.26	4.58	-0.65	0.46	1.74
1985	-5.99	5.23	-0.45	0.64	1.87
1986	-5.53	6.19	-0.16	0.88	1.96
1987	-5.13	6.97	0.11	1.16	2.17

Source: TRACE model simulation results

<sup>15</sup> Tax cut projection less high-price energy projection as a per cent of the latter.

### 7.2.2. Effects on the Ontario Economy

Table 7.11 shows the effects of the tax cut on Ontario output, employment, labour force, and personal disposable income. The percentage effects, given the assumptions contained in the Ontario submodels, are not markedly different from those in the national economy.

Table 7.12 shows the effects on the net cash requirements of the Government of Ontario. As can be seen, the increase in cash requirements results from the fact that, in the model simulation experiment, the induced increase in total government revenue is not quite sufficient to offset both the initial decrease in personal income tax and the induced increase in prices and wages paid by the government.

TABLE 7.11

EFFECTS<sup>16</sup> ON OUTPUT, EMPLOYMENT AND LABOUR FORCE OF AN 8 PER CENT CUT IN PERSONAL INCOME TAX: ONTARIO

	Real Provincial Product	Employment (per cent)	Labour Force	Gross Provincial Product (current dollars)
1978	0.69	0.39	0.45	0.90
1979	0.67	0.51	0.49	0.88
1980	0.85	0.70	0.55	1.22
1981	0.88	0.68	0.55	1.34
1982	1.01	0.78	0.59	1.64
1983	1.07	0.82	0.61	1.87
1984	1.15	0.87	0.64	2.17
1985	1.27	0.96	0.68	2.51
1986	1.44	1.02	0.72	2.98
1987	1.57	1.11	0.77	3.43

Source: TRACE model simulation results.

<sup>16</sup> Tax cut projection less high-price energy projection as a per cent of the latter.

TABLE 7.12  
PUBLIC FINANCE EFFECTS<sup>17</sup> OF AN 8 PER CENT  
CUT IN PERSONAL INCOME TAX: ONTARIO GOVERNMENT

	Personal Income Tax Revenues	Corporate Income Tax Revenues	Retail Sales Tax Revenues	Total Government Revenue	Total Government Expenditure	Net Cash Requirements
	(per cent)					(millions of dollars)
1978	-7.40	2.44	2.34	0.16	0.98	143
1979	-7.57	2.19	2.33	0.11	1.10	187
1980	-7.19	2.81	2.68	0.51	1.48	215
1981	-7.14	2.90	2.82	0.63	1.67	258
1982	-6.91	3.48	3.12	0.97	1.98	286
1983	-6.73	3.77	3.41	1.20	2.26	345
1984	-6.52	4.26	3.75	1.52	2.58	400
1985	-6.31	4.89	4.12	1.87	2.91	468
1986	-6.60	5.78	4.68	2.27	3.39	588
1987	-5.64	6.55	5.24	2.87	3.88	662

Source: TRACE model simulation results.

### 7.3 SENSITIVITY OF PROJECTIONS TO ASSUMPTIONS

#### 7.3.1 A Change in the Immigration Rate

To obtain some indication of the effect of a change in the immigration rate on the Canadian economy, an experiment was conducted which halved the rate of gross immigration to an annual level of 75,000 persons. (Emigration was maintained at 60,000 a year in both runs.) Over a ten-year period the decrease in the population in the tenth year amounted to 840,000 persons, the additional 90,000 being the number of children presumed to be born in Canada to the migrants. The effect on the labour force was to

---

<sup>17</sup> Tax cut projection less high-price energy projection as a per cent of the latter.

reduce it by approximately 30,000 persons a year. The rate of growth in real gross national product was about 0.1 percentage points lower in each year and the unemployment rate was also about 0.1 percentage points lower. In summary, the aggregate effects over the time horizon were all relatively small and consequently the implications of this situation for the Ontario economy were not examined.

### 7.3.2 A Change in the Foreign Exchange Rate

The projection in Chapter Two was based on an assumed foreign exchange rate of \$1.00 Canadian per U.S. dollar. Table 7.13 gives an indication of the sensitivity to a change in the foreign exchange rate.

TABLE 7.13

CHANGE IN MACROECONOMIC VARIABLES RESULTING FROM A 1 PER CENT  
DEPRECIATION OF THE CANADIAN DOLLAR: CANADA

<u>Year</u>	<u>Real GNP</u>	<u>GNP Deflator</u> (per cent)	<u>Unemployment Rate</u>
1	0.19	0.37	-1.98
2	0.11	0.66	-1.61
3	0.06	0.84	-1.03

Source: Simulation with TRACE Mk IIIR reported in Carr, Jump, Sawyer (1976, 110).

As can be seen, a depreciation has a short-term stimulative effect on real output and the unemployment rate which is ultimately offset by the induced increase in the price level.



### 7.3.3 A Change in Real Government Expenditure

As an alternative method of stimulating the economy, increases in real government expenditure on goods and services could be made. Table 7.14 indicates the multiplier effects of such an increase.

TABLE 7.14

EFFECT OF A MAINTAINED INCREASE IN REAL GOVERNMENT EXPENDITURE  
PER BILLION DOLLARS OF REAL EXPENDITURE, ASSUMING FLEXIBLE  
EXCHANGE RATES

Year	Real GNP (billions of dollars)	GNP Deflator (index points)	Unemployment Rate (percentage points)
1	1.08	0.008	-0.512
2	0.85	0.038	-0.544
3	0.41	0.062	-0.358

Source: Simulation with TRACE Mk IIIR reported in Carr, Jump, Sawyer (1976, 112)

These simulations were done with an economy that was close to its potential output level. In an economy which is operating below its potential output level, the real effect would be greater and the price effect correspondingly less.

POLICY ISSUES AND CONCLUSIONS

The focus of this study has been on the development of projections of many of the economic and demographic determinants of the growth of the Ontario economy over the next decade. The projections translated a number of current trends or possible future developments, such as energy investments, into quantitative projections of Ontario output, employment, and labour force and of Ontario government revenues and expenditures. The purpose was to see what problems might emerge if these trends continue or if certain events do occur. The purpose of this chapter is to highlight more explicitly several of the important policy issues facing the Ontario economy over the next decade and, where appropriate, to draw conclusions from the information presented in this study.

From the review of the Canadian economy presented in Chapter Two, it is apparent that the pattern of economic activity for the next decade will be shaped largely by the level and timing of energy investments. A change in the timing or level of the energy investment profile can dramatically alter the pattern of economic activity during the next decade. This conclusion is apparent from the results of the alternative projection outlined in Chapter Seven, where the implications of the Canada Department of Energy, Mines and Resources' low-price energy scenario are examined.

This projection is compared to the high price scenario that is adopted for the bulk of this study.

Apart from the energy investment profile, there are two further characteristics of the national projection that deserve attention. The first is the projected lower rate of growth of population which is reflected in lower labour force growth and consequently in lower growth in the potential output of the Canadian economy. Real personal disposable income per person continues to rise, however, which suggests a rising standard of living over the next decade. The second is the tendency towards an insufficiency of aggregate demand which leads to higher than normal unemployment rates. In the latter part of Chapter Seven, the effects of a cut in personal income tax are examined in order to indicate one possible way of stimulating aggregate demand. Each of the issues mentioned above has important policy content, particularly from a macroeconomic viewpoint, and the chosen policies will have important implications for the pattern of economic activity that is likely to be experienced by the Ontario economy.

The projections of the demographic and labour market sectors of the Ontario economy, developed and presented in Chapter Three, raise a number of important changes that will have to be considered by provincial policy planners over the decade 1977-87. In addition, they suggest a number of important related issues which will also have to be considered in the development of economic and social policy in the province.

Over the projection period, the total population is projected to increase by approximately one and a quarter million persons. This

projection is based on an assumed level of immigration which results in 50,000 new persons entering the province annually. Although the projected population increase is not large by recent historical figures, it implies a gain of approximately 15 per cent and represents a considerable number of new people to be accommodated within the provincial infrastructure. Not only will the requisite housing need to be supplied for these people, but they will require additions to educational, hospital, transportation, recreational and other 'social overhead' facilities if the present level of service is to be maintained or improved. Moreover, a gain of this magnitude has important implications for the level of urbanisation in the province and the problems associated with increases in population density. All of these raise important policy issues associated with the projected increase in the size of the population of the province.

Although the population will be increasing, the growth rate of the population is projected to slow gradually to an annual growth rate averaging 1.4 per cent, compared to growth rates in excess of 3 per cent in the 1950s and in excess of 2 per cent in the 1960s. The projected slowdown in the population growth affects the rate of growth of the potential output of the provincial economy. On a per person basis, however, there may not be much change. That is, the rate of growth in real disposable income per person may not be significantly lower.

These changes are projected to be accompanied by a changing age structure of the population over the decade. An increasingly aging population is apparent, with the number of persons in the school-age (5 to

19 year) groups declining (by over 175 thousand) and those in the senior (65 years and over) age groups increasing (by over 225 thousand) over the decade 1977-87. Those in the university age (20 to 24 year) groups are also projected to increase (by over 50 thousand). In the mid-1980s, however, a trough occurs in the numbers in the school-age groups and a peak in the numbers in the university age groups. These magnitudes and trends have important policy implications for the provision of senior citizen and educational facilities in the province.

Participation rates are important determinants of labour force growth. Their longer-term trends are determined both by traditional labour market factors and by the trends in such factors as urbanisation, fertility, and income supplement programs. The future trends in labour force participation rates are likely to be influenced by the future trends in these factors. For example, if the current historically low fertility rates represent a postponement rather than a cancellation of child-bearing, the participation rates for women will likely be lower than projected. In general, the projections are based on the present levels of these variables and suggest rising labour force participation rates for the young (15 to 24 year) age groups and for prime (25 to 64 year) age women, declining participation rates for prime-age men and little change in the participation rates for older (65 years and over) age groups.

The resulting labour force projections show an increase of almost one million persons over the decade 1977-87. Consequently, at least this



many new 'jobs' must be generated in the province if the unemployment rate is not to increase. Although not a large number by historical standards, this does represent a major challenge to those concerned with policies in the labour markets. Moreover, by analysing the projected trends in the industrial composition in the province, it appears that there must be an increasing orientation towards employment in the service industries. This has important implications for occupational training in Ontario.

The addition to the labour force over the period is projected to be divided almost equally between males and females. This implies that there will be an increase in the percentage of females in the labour force of approximately two per cent over the decade, with the increase concentrated in the prime (25 to 64 year) age group. For males, the increase is concentrated almost entirely in the 25 to 44 year age group. Consequently, labour market policies adopted over this period must take into account not only the changing industrial composition of Ontario industry (the demand side), but also the changing age and sex distribution of the Ontario labour force (the supply side). These projected changes in the demographic and labour sectors in the province clearly present challenging and important issues to be considered in the development of economic and social policy in the province over the next decade.

The analysis of the Canadian capital market presented in Chapter Four indicates that business fixed investment will be at an historically high level during most of the period 1977-87. Much of this investment boom is, of course, energy related. The high level of investment will be

financed by a combination of higher personal saving, greater corporate cash flows and a higher net inflow of capital from abroad. Although a high level of aggregate real investment is indicated in the macroeconomic projections, it is likely that occasional bottlenecks may appear in response to such factors as changes in the relative prices and costs of energy use. Adjustments in interest rates, a key element of the cost of capital, should continue to ensure that the flow of saving is efficiently allocated among competing uses.

The most significant development in capital markets which will affect the Province of Ontario in the 1980s is a marked reduction in the flow of funds available from the Canada Pension Plan and other superannuation funds. For the past ten years, Ontario has relied almost exclusively on borrowing from these non-public sources to meet its cash requirements. In view of the apparent importance to the Province of maintaining its high credit rating, and thus ensuring its access to the United States capital market, the input of financing considerations into taxation and/or expenditure decisions will undoubtedly assume greater importance in the years ahead. Because of the interdependence of the borrowing requirements of the Province and Ontario Hydro, planned capital expenditures of Ontario Hydro may also be adjusted in response to the tightening financing constraints. If contribution rates to the Canada Pension Plan were to be increased, some of the pressure emanating from the reduced flow of non-public funds would be postponed, but not eliminated. The likelihood that the contribution rates to the Canada Pension Plan will be increased in

the near future has been reduced in light of the recent recommendation of its Advisory Committee that the Plan be funded on a "pay-as-you-go" basis. Consequently there is likely to be continued pressure on provincial taxation and/or expenditure decisions over the next decade resulting from the reduced flow of non-public funds from the capital markets.

The conditional projections of provincial government revenues and expenditures presented in Chapter Five, which are based upon econometric techniques of estimation drawing upon the historical experience of the last two decades, bring these pressures into a much clearer focus. They clearly show that if the historical trends in the determinants of fiscal policy in Ontario are permitted to continue, total expenditures are likely to outrun total revenues, particularly during the last half of the decade to 1987. The Province would accordingly be obliged to raise funds to finance about one quarter of its total expenditures by 1987, almost twice the current proportion. Net cash requirements on such a scale by the Province on its own account could be sufficient to create considerable financing difficulties in Canadian and foreign capital markets. The shortage of non-public funds in the Canadian market outlined in the previous paragraph makes the situation even more serious. In addition, when the borrowing requirements of Ontario Hydro, which are considerably higher in the low-price energy scenario than in the high-price scenario, are added to the provincial cash requirements, the need for remedial fiscal measures is all the more clearly apparent.

Such remedial action could reasonably be expected to embrace a wide-ranging series of measures. Financing requirements of Ontario Hydro

will be lower, the slower is the rate of growth of demand for its services. Ontario might, therefore, reasonably be expected to support pricing policies which would tend to reduce the rate of growth in consumption of electricity. National pricing policies for oil and natural gas similar to those in the high-price energy scenario would encourage domestic exploration and development with respect to the alternative energy sources, so that less reliance would have to be placed upon electricity. Also Ontario Hydro's own rate schedules might be revised upwards and redesigned to offer further incentives to customers to economize on electricity use. Such changes in pricing policy for electricity, of course, have a two-fold effect in reducing Ontario Hydro's reliance on external funding. For any given level of generating capacity more revenue is derived internally, and the rate at which generating capacity is required to expand is less than it otherwise would be. Recent substantial increases in rates charged by Ontario Hydro demonstrate that this one possible avenue of remedial action is already being followed to some extent.

So far as net cash requirements of the Province on its own account are concerned, measures can be expected which are designed to increase revenues and/or decrease expenditures relative to the levels projected. Projected taxation revenues, for example, are based on current rates of taxation. Some of these tax rates may be increased, and some sources of non-taxation revenue may also be augmented. But very substantial increases would be required to close the projected gap between growth rates for total



revenues and total expenditures. Moreover, it appears unlikely that the federal government can be counted on to solve the problem by the increased provision of sufficient funds to the province.

There can be little doubt, then, that expenditures cannot be allowed to grow at rates as high as those projected. The government's current stance of expenditure restraint can be interpreted as evidence that the need for action on this front is already recognized. The implication of the projections is that restraint of this sort is likely to remain a fact of life throughout the period to 1987 rather than being a transitory phenomenon. The government's current target rate of growth of expenditures is sufficiently lower than that projected, that it could reduce the projected net cash requirements by half if continued over the period to 1982. Together with moderate increases in tax rates and yields in non-taxation revenues, such a stance might be adequate to avoid any serious financing problems which might otherwise arise purely on the Province's own account. Over the period from 1982 to 1987, however, further increases in taxation or other revenue sources are likely still to be required and even more stringent control over expenditures would have to be imposed if projected increases in financing requirements are to be avoided.

As an aside, it is worth noting that these observations highlight an essential difference between a conditional projection and a forecast. The conditional projections of provincial government revenues and expenditures presented in Chapter Five are based on the general assumptions of unchanged tax rates and continued expenditure growth following historical



trends. Yet these general assumptions produce projections which, especially when combined with the conclusions from the capital market analysis of Chapter Four, are unlikely to be realised because of the seriousness of their policy implications. In such an approach, however, the important policy issues facing the province become very clear and the broad alternative policy solutions can therefore be more easily outlined. The analyses presented in Chapters Four and Five of this study provide a good example of this approach.

A general feature of the growth pattern in industry output and employment for the Ontario economy examined in Chapter Six is the increase in growth rates over the next five years followed by a subsequent slowdown, both reflecting the energy profile outlined in Chapter Two. Of particular interest is the general conclusion that the service-producing industries will gain relative to the goods-producing industries over the period. It is important to recognize that, to a large extent, this projected change in the industrial structure of the provincial economy is in response to continued growth in the relative demand for services. Consequently, there should not be an overreaction, particularly from a policy viewpoint, to the relative decline of the importance of the goods-producing industries in Ontario.

A consequence of the analyses of Chapters Three and Six is that, despite the slowdown in population growth, it is still expected that the labour force will grow more rapidly than will employment, at least in the early part of the decade. To keep unemployment from rising significantly

will require both an increase in aggregate demand above that assumed in the projection and specific training schemes for unemployment workers in order to qualify them for the available jobs, particularly in the service industries, and thereby reduce structural unemployment.

In order that increased real investment can contribute to raising the level of aggregate demand, uncertainties about the return on investment should be reduced as much as possible. Moreover, in order that economies of scale may be achieved, it is desirable to expand the size of markets. This suggests that barriers to trade, both interprovincial and international, should be reduced.

In general, policies (both national and provincial) which keep the economy growing at its potential output growth rate are essential. Only in this way can resources, both human and nonhuman, not be wasted. Unfortunately, this appears to be becoming increasingly easier to recommend and harder to implement. A fundamental policy dilemma can be seen, for example, in the previously documented need for additional restraint by the Province of Ontario in the years ahead, while there is at the same time a concern that total demand for goods and services in the Canadian economy may be insufficient for the economy to grow at its potential.

All of the issues raised in this chapter follow directly or indirectly from the conditional projections developed in this study. They suggest that those concerned with the development of economic and social policy in the Province over the next decade will be faced with a number of important policy decisions, since a realisation of the conditional

projections presented in this study would have serious implications, especially for the financing requirements of the provincial government and, to a lesser extent, for labour market conditions in the province. This suggests that continued policy surveillance will be necessary on a variety of important issues if the Ontario economy is to realise its economic potential over the next decade without encountering significant problems in one or more of the areas reviewed in this study.

## BIBLIOGRAPHY

Bank of Canada Review, various issues

Bodie, Z. (1976) "Common stocks as a hedge against inflation." Journal of Finance 31, 459-470

Bosworth, Barry (1976) "Capacity-creation in the basic-materials industries." Brookings Papers on Economic Activity 1976: No. 2, 297-341

Bosworth, B., J.S. Duesenberry and A.S. Carron (1975) Capital Needs in the Seventies (New York: The Brookings Institution)

Canada (1975) Advisory Committee of the Canada Pension Plan, The Rate of Return on the Investment Fund of the Canada Pension Plan (Ottawa)

Canada, Department of Energy, Mines and Resources (1976) An Energy Strategy for Canada: Policies for Self-Reliance (Ottawa: Information Canada)

Canada, Department of Regional Economic Expansion (1975) Industry Output-Employment in CANDIDE-R, Working Paper No. 6, Economic Analysis Division (Ottawa)

Carr, J.L., G.V. Jump and J.A. Sawyer (1976) "The operation of the Canadian economy under fixed and flexible exchange rates: Simulation results from the TRACE model." Canadian Journal of Economics 9, 102-120

Carr, J.L., J.E. Pesando and L.B. Smith (1976) "Tax effects, price expectations and the nominal rate of interest." Economic Inquiry 14, 256-269

Choudhry, N.K., Y. Kotowitz, J.A. Sawyer and J.W.L. Winder (1972)

The TRACE Econometric Model of the Canadian Economy (Toronto: University of Toronto Press)

Cohen, C.P. (1976) A Canadian Population Projection Model. Technical

Paper No. 9, Institute for Policy Analysis, University of Toronto

Dallimore, D.C. and B. Lampert (1973) "Demographic trends in Ontario:

Some policy considerations." Ontario Economic Review 11, 1-12

Denton, F., C.H. Feaver and A.L. Robb (1975) "Patterns of unemployment

behavior in Canada." Discussion Paper No. 36, Economic Council of Canada (Ottawa)

Economic Council of Canada (1975) Twelfth Annual Review: Options for

Growth (Ottawa: Economic Council of Canada)

Foot, D.K. (1975a) "Canada's declining long-term output growth."

Canadian Review 3, 5-17

\_\_\_\_\_ (1975b) Provincial Public Finances in Ontario. A report submitted to the Ontario Economic Council, August, 1975

\_\_\_\_\_ (1976) Provincial Public Finances in Ontario. A report submitted to the Ontario Economic Council, December, 1976

Green, C. and J.-M. Cousineau (1976) Unemployment in Canada: The Impact

of Unemployment Insurance (Ottawa: Economic Council of Canada)

Grubel, H.G., D. Maki and S. Sax (1975) "Real and insurance-induced

unemployment in Canada." Canadian Journal of Economics 8, 174-191

Haronitis, D. (1971) "An econometric model for the Ontario economy."



Ontario Economic Review 8, Special Supplement

- Illing, W.M. (1973) CANDIDE Model I.O.: Labour Supply and Demographic Variables, CANDIDE Project Paper No. 9 (Ottawa: Economic Council of Canada)
- Jaffe, J.F. and G. Mandelker (1976) "The 'fisher effect' for risky assets: An empirical investigation." Journal of Finance 31, 447-458
- Johnston, J. (1972) Econometric Methods, 2nd edition (New York: McGraw-Hill)
- Jump, G.V. and S.A. Rea, Jr. (1975) "The impact of the 1971 unemployment insurance act on work incentives and the aggregate labour market." Institute for Policy Analysis, University of Toronto, unpublished report
- Jutlah, C.B. (1974) "A long-term economic forecast for Canada and Ontario." Ontario Economic Review 11, 1-18
- Martin, Fernand (1976) Regional Aspects of the Evolution of Canadian Employment. Economic Council of Canada (Ottawa: Information Canada)
- Matuszewski, T.I., P.R. Pitts and J.A. Sawyer (1972) "Estimates of inter-industry input-output coefficients, 1956 and 1959." in Choudhry et. al. (1972), 152-156
- McCracken, M.C. (1973) An Overview of CANDIDE Model 1.0. CANDIDE Project Paper No. 1, Economic Council of Canada (Ottawa: Information Canada)
- McKeough, Darcy (1977) "Remarks at the Canadian pension conference."

Royal York Hotel, Toronto, January 20, 1977.

Meltz, N.M. and F. Reid (1976) "The recent shift in the Canadian unemployment-vacancy relationship and its implications for labour-market policies." Working Paper 7601, Centre for Industrial Relations, University of Toronto.

National Energy Board (1975a) Canadian Natural Gas Supply and Requirements (Ottawa)

\_\_\_\_\_ (1975b) Canadian Oil Supply Requirements (Ottawa)

Nehlawi, J.E. (1977) "Consistent estimation of real econometric models with undersized samples: A study of the TRACE econometric model of the Canadian economy." International Economic Review, forthcoming

Nelson, C.R. (1976) "Inflation and the rates of return on common stock." Journal of Finance 31, 471-482

Officer, L.H. and P.R. Andersen (1969) "Labour-force participation in Canada." Canadian Journal of Economics 2, 278-287

Ontario, Budget (1973)

\_\_\_\_\_ Budget (1975)

\_\_\_\_\_ Budget (1976)

\_\_\_\_\_ Financial Report (1976), 14-16

\_\_\_\_\_ Finances (1976), September 30

\_\_\_\_\_ Public Accounts, various issues

\_\_\_\_\_ Statistics 1975

Ontario Hydro (1975) Annual Report 1975

Ontario Ministry of Treasury, Economics and Intergovernmental Affairs

- (1976a) Long Term Economic Outlook for Ontario. Policy Planning Branch (Toronto)
- \_\_\_\_\_ (1976b) Long Term Outlook for Labour Force Growth: Canada and Ontario (Toronto)
- \_\_\_\_\_ (1976c) A Long Term Projection of Ontario's Industrial Development Pattern (Toronto)
- \_\_\_\_\_ (1976d) Ontario's Economic Strategy for 1977 (Toronto)
- \_\_\_\_\_ (1976e) Review of Issues in Financing the Canada Pension Plan (Toronto)
- Pesando, J.E. (1976) "The impact of inflation on financial markets in Canada." Report prepared for the C.D. Howe Research Institute
- Pesando, J.E. and S.A. Rea, Jr. (1976) "Retirement incomes and public policy." Report prepared for the Ontario Economic Council
- Proulx, P.-P. (1969) "La variabilité cyclique des taux de participation à la main-d'oeuvre au Canada." Canadian Journal of Economics 2, 268-277
- Rea, S.A., Jr. (1977) "Unemployment insurance and labour supply: A simulation of the 1971 unemployment insurance act." Canadian Journal of Economics (forthcoming)
- Sawyer, John A. (1974) TRACE Mk IIIR: An Annual Econometric Model of the Canadian Economy. Report No. 5, Institute for Policy Analysis, University of Toronto
- Sinai, H. and R.E. Brinner (1975) The Capital Shortage: Near-Term Outlook for Long-Term Prospects (Lexington, Mass.: Data Resources Incorporated)

Solow, R.M. (1957) "Technical change and the aggregate production function."

Review of Economics and Statistics 39 (August), 312-320

Statistics Canada (13-505, 1976) Energy Consumption in Manufacturing and Mining Industries, Selected Years, 1926-1953 (Ottawa)

\_\_\_\_\_ (14-201, 1976) Aggregate Productivity Measures, 1946-1974 (Ottawa)

\_\_\_\_\_ (61-005, monthly) Indexes of Real Domestic Product by Industry  
(Ottawa)

\_\_\_\_\_ (61-002, 1975) Commerical Failures, Quarterly (Ottawa)

\_\_\_\_\_ (61-202, 1975) Survey of Production, 1973 (Ottawa)

\_\_\_\_\_ (61-205, 1976) Private and Public Investment in Canada: Outlook, 1976 (Ottawa)

\_\_\_\_\_ (68-201, various) Principal Taxes and Rates (Ottawa)

\_\_\_\_\_ (68-207, various) Provincial Government Finance, Revenue and Expenditure (Ottawa)

\_\_\_\_\_ (71-001, various) The Labour Force (Ottawa)

\_\_\_\_\_ (72-514, 1976) Estimates of Employees by Province and Industry, 1961-1974 (Ottawa)

\_\_\_\_\_ (91-514, 1974) Population Projections for Canada and the Provinces, 1972-2001 (Ottawa)

\_\_\_\_\_ (91-516, 1975) Technical Report on Population Projections for Canada and the Provinces, 1972-2001 (Ottawa)

\_\_\_\_\_ (92-716, 1973) 1971 Census of Canada: Population (by) Single Years of Age, Vol. 1, part 2 (Ottawa)

\_\_\_\_\_ "Revisions of the labour force survey." Canadian Statistical

Review 51 (March), 10-11 and 124-126

Swidinsky, R. (1970) "A note on labour-force participation and unemployment." Canadian Journal of Economics 3, 146-151

Toronto-Dominion Bank (1976) Oil, Natural Gas and Coal. Occasional Paper, 5: No. 1

Wachtel, P., A. Sametz and H. Shuford (1976) "Capital shortages: Myth or reality?" Journal of Finance 31, 269-286

Wilson, T.A. and G.V. Jump (1976) "Overview: An abortive recovery?" Canadian Review 4, No. 5 (December), 5-10

Winder, J.W.L. (1976) "Canada's energy strategy." Canadian Review 4, No. 2 (June), 5-22







HC  
117  
.06  
.I8367

The Ontario economy, 1977-1987.

ECCB

DEC 12 1996

SEP 8 2005



